

PCI Express Board User's Manual

Multiport Serial Board for PCI Express Bus

Third Edition, June 2008

www.moxa.com/product



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PCI Express Board User's Manual

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Moxa's PCI Express serial boards meet the new slot standard for expansion boards, and work with any PCI Express slots. The boards have multiple RS-232/422/485 serial ports for connecting data acquisition equipment and other serial devices to a PC.

This chapter covers the following topics:

- ☐ **Overview**
- ☐ **Applications**
- ☐ **Features**
- ☐ **Package Checklist**
- ☐ **Installation Flowchart**

Overview

Moxa's new PCI Express Multiport Serial Boards, named CP-118EL, CP-168EL, and CP-104EL, are designed for POS and ATM applications and for use by industrial automation system manufacturers and system integrators. The boards are compatible with all popular operating systems, and each of them supports data rates of up to 921.6 Kbps, and provides full modem control signals, ensuring compatibility with a wide range of serial peripherals. In addition, CP-118EL, CP-168EL, and CP-104EL work with PCI Express $\times 1$, allowing the boards to be installed in any available PCI Express slot (including $\times 1$, $\times 2$, $\times 4$, $\times 8$, $\times 16$, $\times 32$).

PCI Express Solution

The boards comply with PCI Express Spec. 1.1. The serial transmission mode (RS-232, RS-422, 2-wire RS-485, or 4-wire RS-485) for each port is set with onboard switches (CP-118EL has DIP Switches, CP-168EL and CP-104EL are RS-232 only), but the ports' transmission parameters are configured after the boards are installed. The PCI BIOS automatically assigns the IRQ and I/O addresses. For this reason, you must plug the boards into the computer before installing the drivers. For more PCI Express information, refer to the "Technical Reference" appendix.

Surge Protection

The PCI Express boards come with built-in 15 KV ESD surge protection to prevent damage to the boards from lightning or high potential voltage. The surge protection feature makes the PCI Express boards suitable for industrial, factory-type applications, and for use with applications that are subject to severe weather conditions.

ADDC™ (Automatic Data Direction Control) for RS-485

To make 2-wire RS-485 half-duplex connections easier to manage, ADDC™ (Automatic Data Direction Control) intelligence is built into the CP-118EL board, eliminating the need for software interference. Windows applications can be set up to manage RS-485 ports without writing additional code to control the half-duplex protocol.

Operating System Support

The PCI Express boards are compatible with all major industrial platforms, including Windows 2000/XP/2003, DOS, and Linux. Moxa device drivers are provided for smoother installation, configuration, and performance. In this manual, we provide installation details for Windows 2003/XP, Windows 2000, DOS, Linux, and SCO.

Visit Moxa's website at www.moxa.com to download the latest drivers and user's manuals for all of Moxa's products.

Moxa Serial Comm Tool

For application development, Moxa provides an easy-to-use serial communication library called PComm that runs under Windows NT/2000/XP/2003/95/98. Use this library to develop your own applications with Visual Basic, Visual C++, Borland Delphi, etc. Utilities, such as Data Scope, Monitor, Terminal Emulator, and Diagnostics are included to make it easier to debug, monitor communication status, provide terminal emulation, and transfer files.

Applications

The PCI Express boards are suitable for many different applications, including:

- Internet/Intranet Connections
- Remote Access
- Multi-user Applications
- Industrial Automation
- Office Automation
- Telecommunications
- PC-based Vending Machines and Kiosks
- POS (Point-of-Sale) Systems

Features

The PCI Express boards have the following outstanding features:

- PCI Express ×1 compliant
- Low profile board for compact-sized PCs
- Data flow LED display onboard
- Moxa UART with 128-byte FIFO driver
- 50 bps to 921.6 Kbps transmission speed
- Supports both 4-wire and 2-wire RS-485 (CP-118EL)
- 2-wire RS-485 data control with ADDC™ (CP-118EL)
- Embedded 15 KV ESD surge protection
- Drivers for all major industrial platforms—Windows 2000, Windows XP/2003 (32-bit/64-bit), DOS, Linux (32-bit/64-bit), SCO, FreeBSD 4.x/5.x

Package Checklist

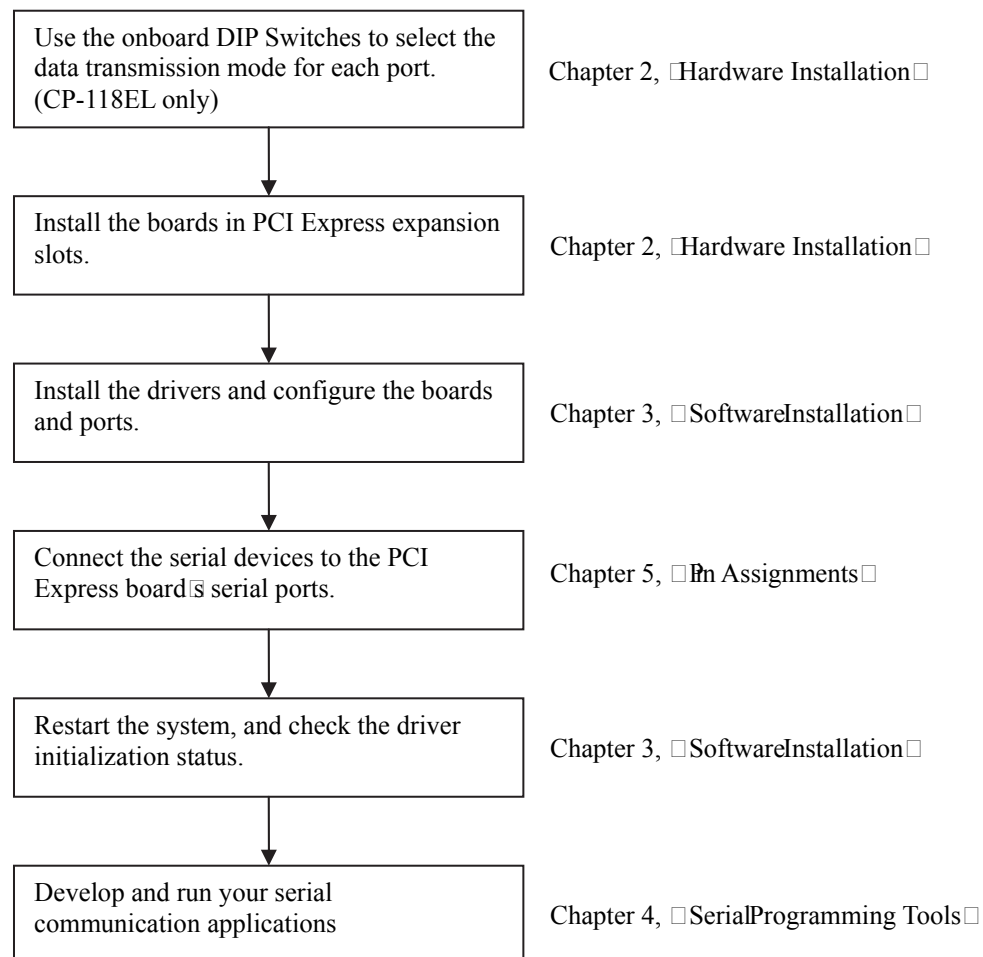
The following items are included in the PCI Express board package:

- PCI Express serial board
- Document and Software CD-ROM
- Quick Installation Guide
- Low profile bracket

NOTE: *Notify your sales representative if any of the above items are missing or damaged.*

Installation Flowchart

The following flowchart provides a brief summary of the procedure you should follow to install the PCI Express boards and also provides references to chapters with more detailed information:



2

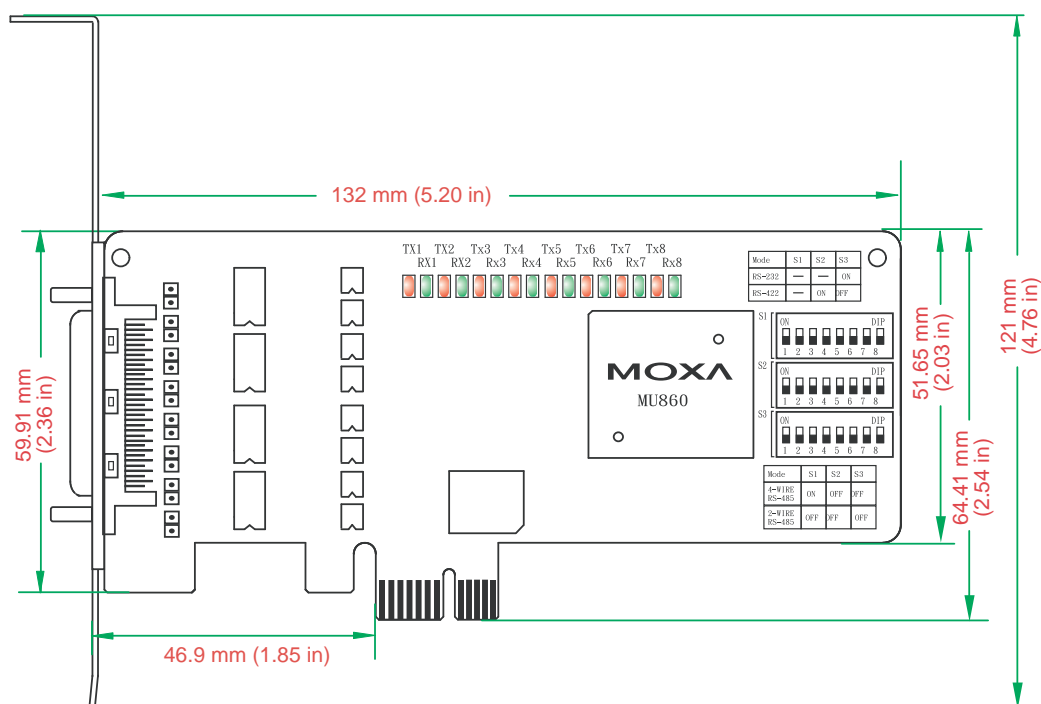
Hardware Installation

This chapter describes the PCI Express Series hardware installation procedure. Since the BIOS automatically assigns the PCI Express board's IRQ number and I/O addresses, you must plug in the board before installing the driver.

This chapter covers the following topics:

- ❑ **CP-118EL Dimensions**
- ❑ **DIP Switch Settings (CP-118EL only)**
- ❑ **CP-168EL Dimensions**
- ❑ **CP-104EL Dimensions**
- ❑ **Plugging the Board into an Expansion Slot**

CP-118EL Dimensions



NOTE: Use JP1/2/3/4/5/6/7/8 to activate the Termination Resistors for ports 1/2/3/4/5/6/7/8.

Open Termination Resistor is NOT active

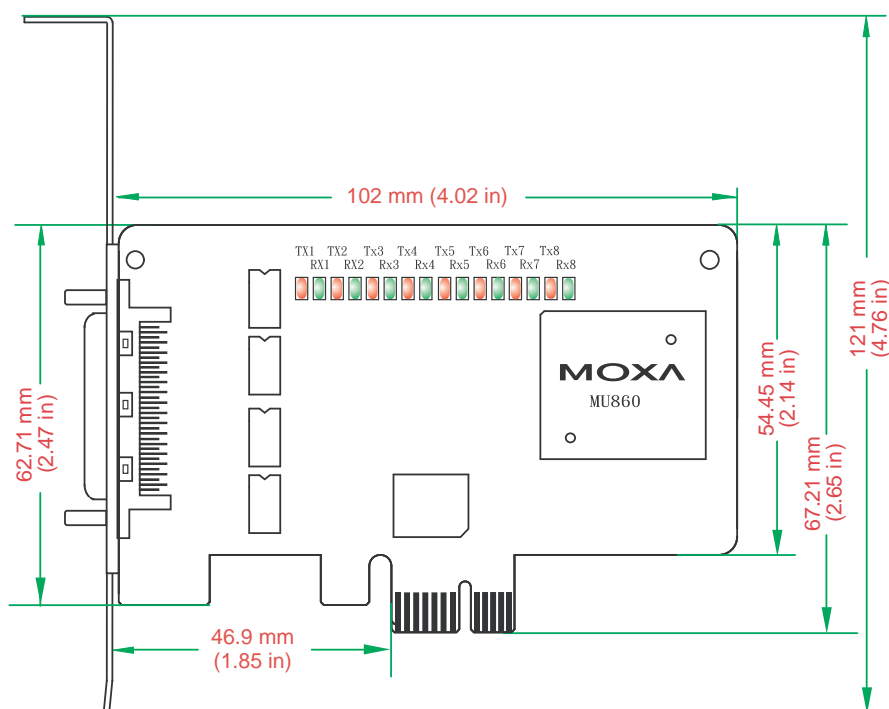
Short Termination Resistor is ACTIVE

DIP Switch Settings (CP-118EL only)

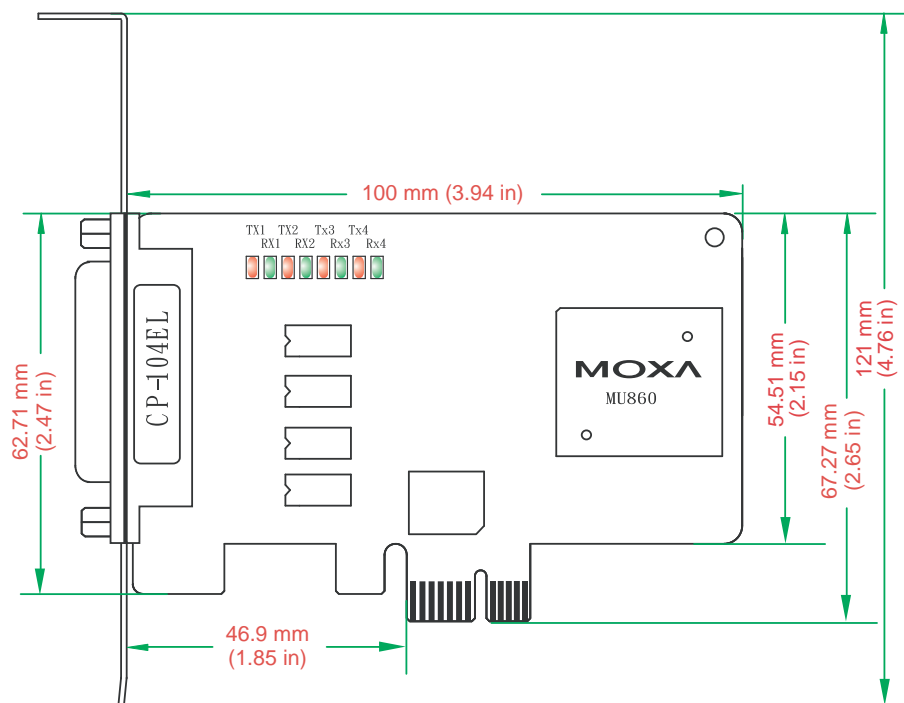
CP-118EL has three onboard DIP Switch arrays, each with 8 switches, shown as follows and on the board (see the above block diagram) as S1, S2, and S3. The switches are used to select one of four serial interfaces—RS-232, RS-422, 4-wire RS-485, 2-wire RS-485—for each of the eight ports. Note that S3 selects between RS-232 and RS-422/485, S2 selects between RS-422 and RS-485, and S3 selects between 2-wire and 4-wire RS-485.

Mode	S1	S2	S3
RS-232	---	---	ON
RS-422	---	ON	OFF
4-Wire RS-485	ON	OFF	OFF
2-Wire RS-485	OFF	OFF	OFF

CP-168EL Dimensions



CP-104EL Dimensions



Plugging the Board into an Expansion Slot

Since the BIOS automatically assigns the PCI Express board's IRQ number and I/O addresses, you must plug the board into one of the computer's expansion slots before installing the driver.

Step 1: Power off the PC.



WARNING

To avoid damaging your system and board, make sure you turn off your computer before installing the board.

Step 2: Remove the PC's cover.

Step 3: Remove the slot cover bracket if there is one.

Step 4: Use the onboard DIP Switches to set the transmission mode for each port (see the previous section for details); (CP-118EL only)

Step 5: Plug the PCI Express board firmly into a free PCI Express slot.

Step 6: Fasten the holding screw to fix the control board in place.

Step 7: Replace the PC's cover.

Step 8: Power on the PC. The BIOS will automatically set the IRQ and I/O address.

NOTE

Each Moxa PCI Express board uses one unique IRQ and I/O address, both of which are assigned automatically by the PCI BIOS.

Step 9: Proceed with the software installation discussed in the next chapter, "Software Installation."

Software Installation

This chapter gives installation, configuration, and update/removal procedures for the driver for Windows 2000, Windows 2003/XP (32-bit/64-bit), DOS, Linux (32-bit/64-bit), and SCO, and WinCE 5.0. Before proceeding with the software installation, complete the hardware installation discussed in the previous chapter, “Hardware Installation.”

Refer to the next chapter, “Serial Programming Tools,” for information about developing your own serial programming applications. Note that you can install up to 4 PCI Express boards in one system, provided sufficient I/O address and IRQ number resources are available.

You can download the Windows 2000/XP/2003, DOS, Linux, and SCO, and WinCE 5.0 drivers from the Moxa website.

This chapter covers the following topics:

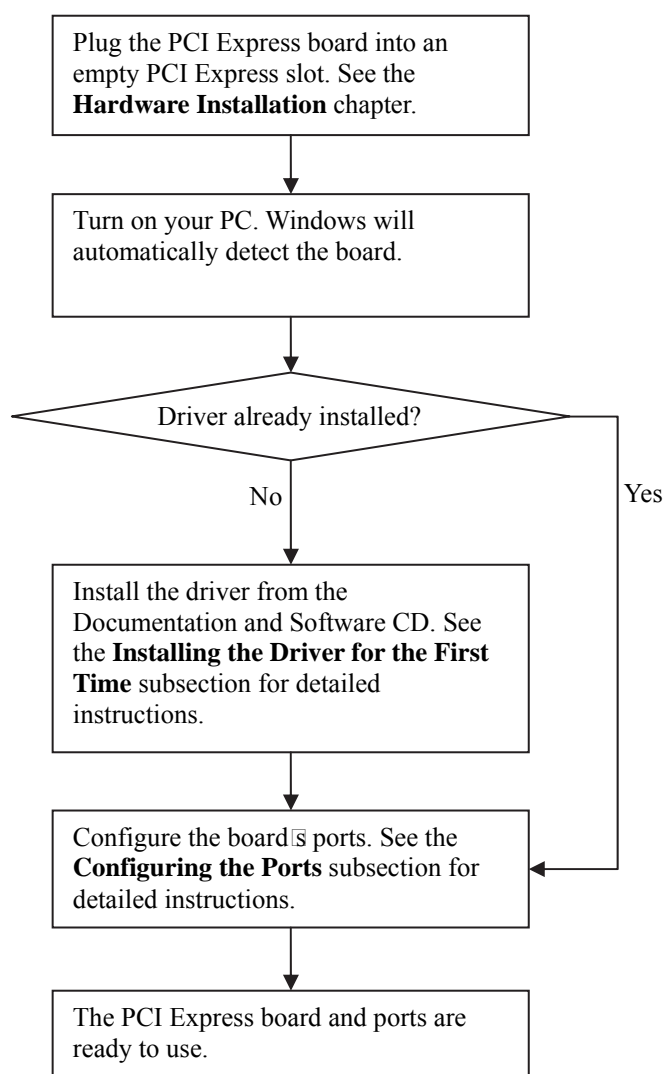
- ❑ **Windows Drivers**
 - Windows 2003/XP (32-bit/64-bit)
 - Windows 2000
- ❑ **Non-Windows Drivers**
 - DOS
 - Linux (32-bit/64-bit)
 - SCO
- ❑ **Windows CE 5.0**
 - Installing the driver

Windows Drivers

Moxa provides drivers that allow you to use the following serial board products under Windows 2003/XP/2000, Windows 98/95, and Windows NT. Windows 95/98/NT do not support PCI Express drivers.

- **PCI Express Boards:** CP-118EL, CP-168EL, CP-104EL
- **Universal PCI Boards:** CP-118U, CP-168U, CP-104UL, CP-104JU, CP-102U, CP-102UL, CP-134U, CP-134U-I, CP-132UL, CP-132UL-I V2 (CP-132U-I V1)
- **PCI Boards:** C168H/PCI, C104H/PCI, C104HS/PCI, CP-114, CP-114I, CP-114S, CP-114IS, CP-132, CP-132I, CP-132S, CP-132IS
- **ISA Boards:** C168H, C168HS, C168P, C104H, C104HS, C104P, CI-104J, CI-104JS, CI-134, CI-134I, CI-134IS, CI-132, CI-132I, CI-132IS
- **cPCI Boards:** CT-114I

The overall procedure for installing the Windows drivers for the PCI Express boards is summarized in the flowchart on the right.



**WARNING**

If you are installing a PCI Express board on an ASUS A8N Series (AMD CPU) motherboard and the installation process hangs the first time, then restart the PC to reinstall it.

NOTE

The following steps use CP-118EL as an example. The installation process for CP-168EL and CP-104EL are the same.

Windows 2003/XP (32-bit/64-bit)

In this section, we describe the installation procedure for Windows XP. The installation procedure for Windows 2003 is similar.

Windows 2003/XP support up to 256 serial ports, from COM1 to COM256. In order to make the best use of Windows 2003/XP's multi-process/multi-thread advanced features, 32-bit and 64-bit Windows 2003/XP device drivers were developed for Moxa multiport boards. The drivers conform to the Win32 COMM API standard.

Installing the Driver

The following procedure shows how to install the CP-118EL driver for the first time under Windows XP. First, make sure that you have already plugged the board or boards into the system's PCI Express slot(s).

NOTE

If you have already installed a CP-118EL or other Moxa PCI Express board in your computer, and you are installing additional boards, Windows 2003/XP will automatically detect and install the new board(s) the next time you boot up the computer. In this case, proceed directly to the next section, "Configuring the Ports," to configure the ports' serial transmission parameters.

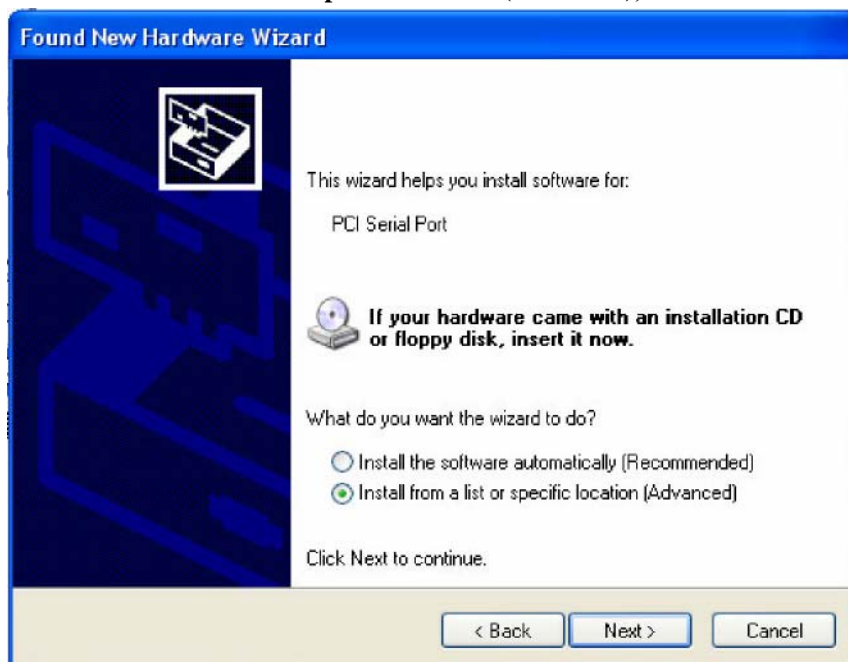
1. After plugging the board into an expansion slot and powering on your PC, Windows XP will automatically detect the new board, and the **Found New Hardware** balloon will open in the bottom right corner of the Windows desktop.



2. The **Welcome to the Found New Hardware Wizard** window will open automatically. This window will offer to connect to the Windows update site to search for a driver. Select **No, not at this time** and click **Next** to continue.

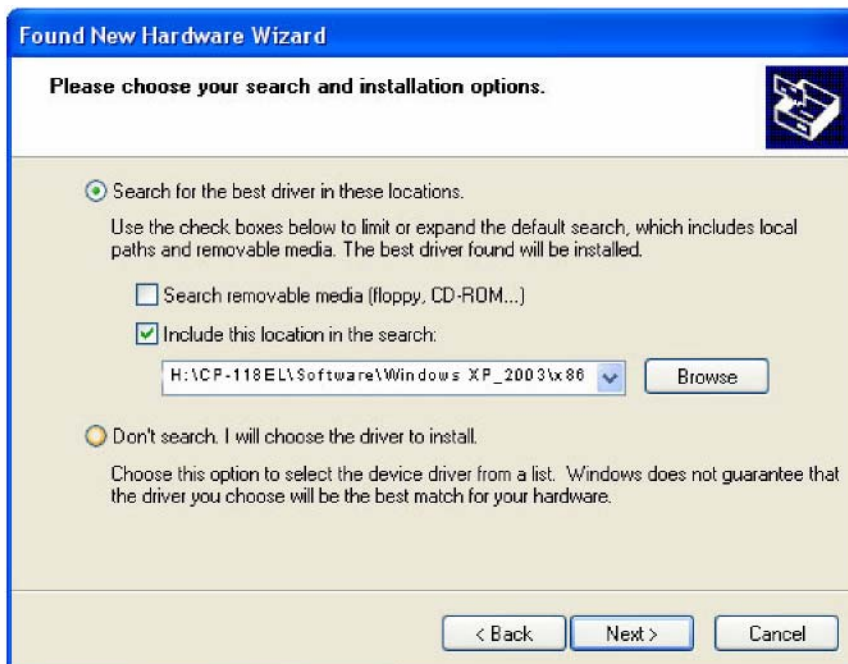


3. Select **Install from a list or specific location (Advanced)**, and then click **Next** to continue

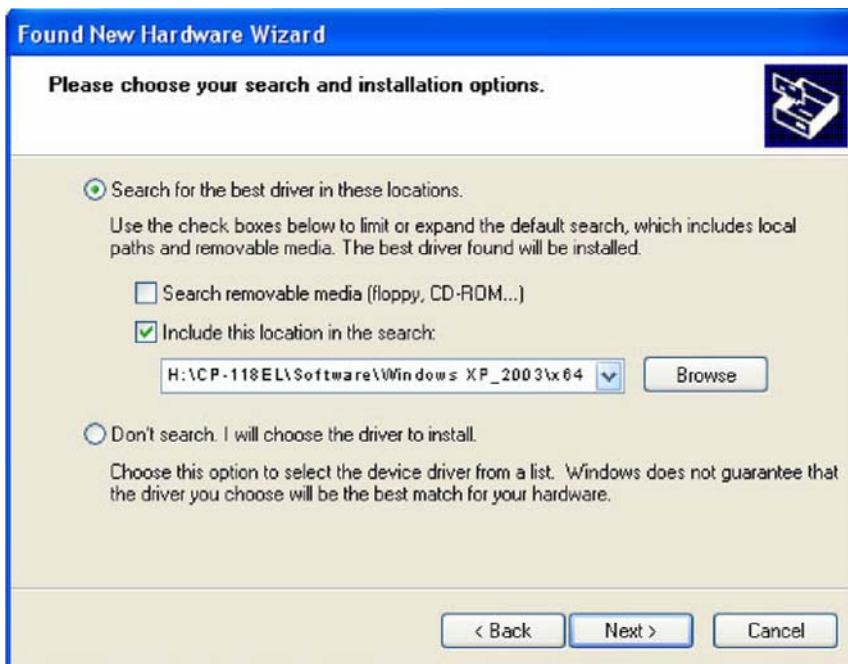


4. Select **Search for the best driver in these locations**, select **Include this location in the search**, and then click **Browse**. If the system is a 32-bit (x86) platform, navigate to the \CP-118EL\Software\Windows XP_2003\x86 folder on the CD. If the system is a 64-bit (x64) platform, navigate to the \CP-118EL\Software\Windows XP_2003\x64 folder on the CD, and then click **Next** to continue.

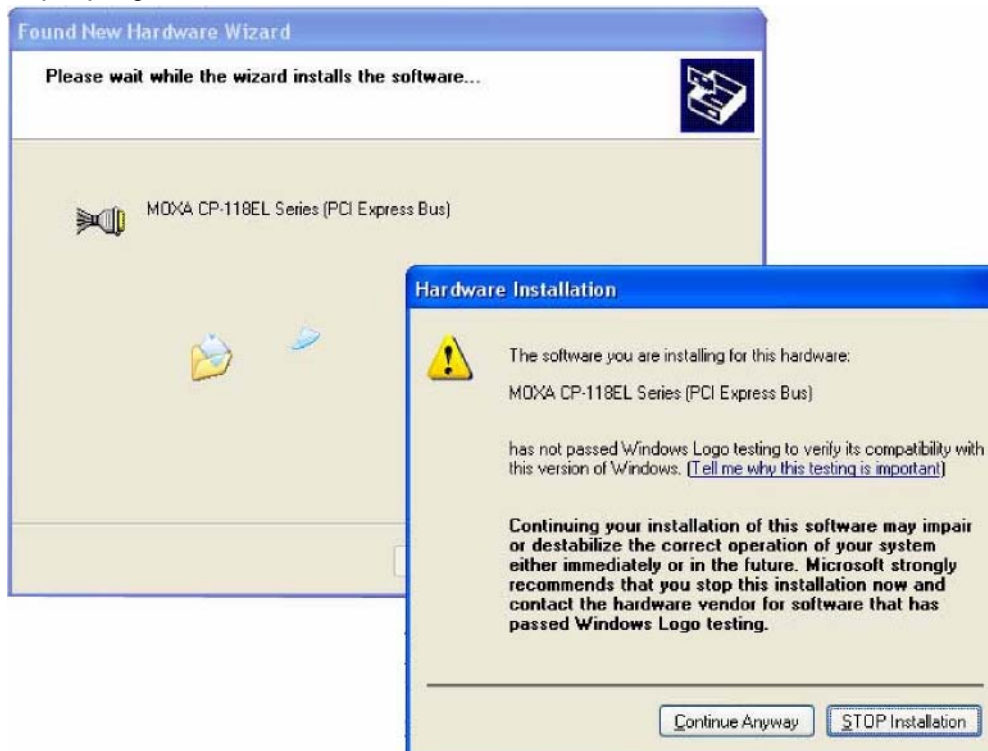
The following figure shows the path for x86.



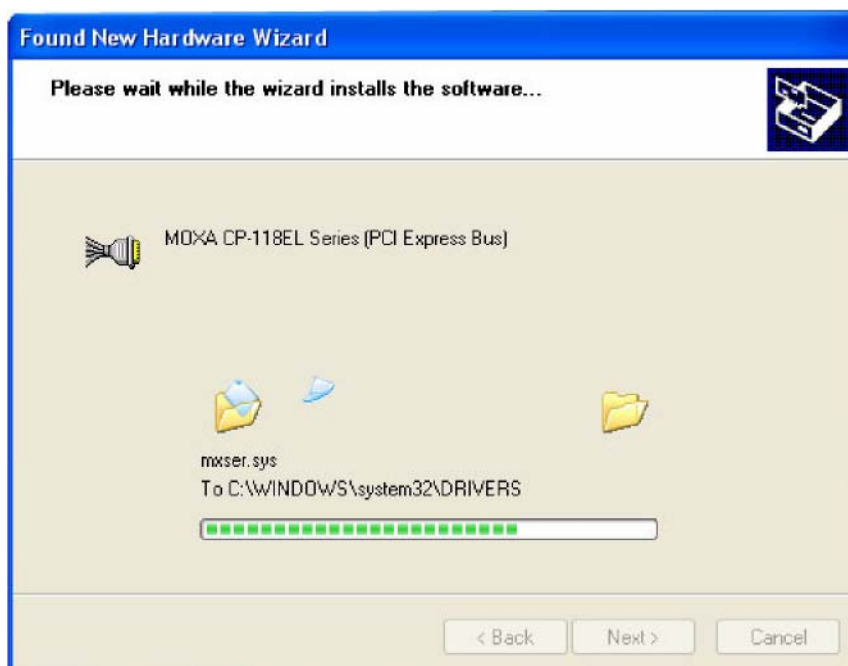
The following figure shows the path for x64.



5. Wait while the installation wizard searches for the correct drivers. The next window that opens cautions you that although this software has not passed Windows Logo testing, the driver has been tested and shown that it can support the Windows OS. Click **Continue Anyway** to proceed.



6. Wait while the driver software is installed.



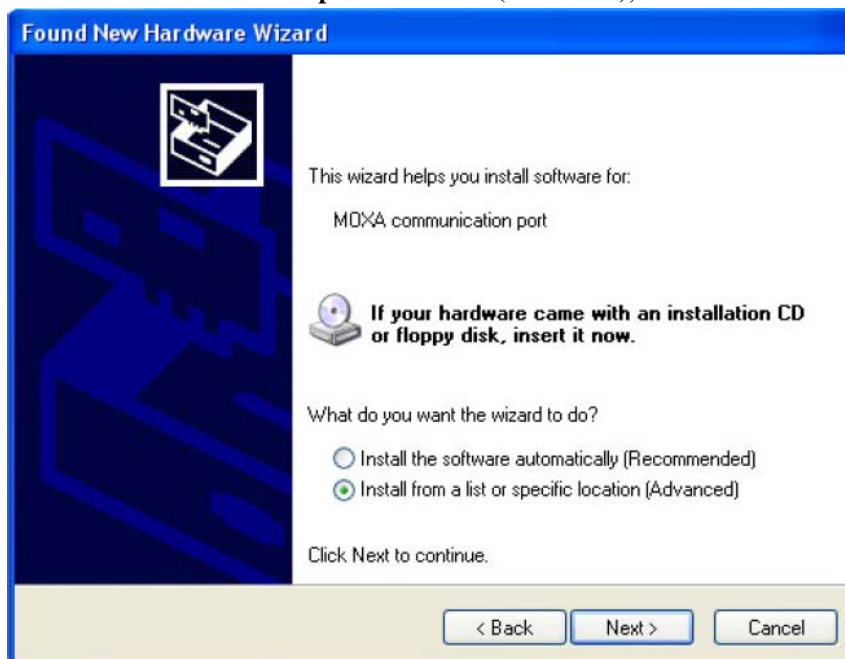
7. The next window shows the model name of the board, and indicates that Windows has completed the driver installation. Click **Finish** to proceed with the rest of the installation procedure.



8. The **Found New Hardware Wizard** window will open to help you install the driver for Moxa Port 0. This window will offer to connect to the Windows update site to search for a driver. Select **No, not at this time** and then click **Next** to continue.



9. Select **Install from a list or specific location (Advanced)**, and then click **Next** to proceed.



10. Select **Search for the best driver in these locations**, select **Include this location in the search**, and then click **Browse**. If necessary, use the **Browse** button to navigate to the \CP-118EL\Software\Windows XP_2003\x86 folder (32 bit platform) or \CP-118EL\Software\Windows XP_2003\x64 folder (64 bit platform), and then click **Next** to proceed.

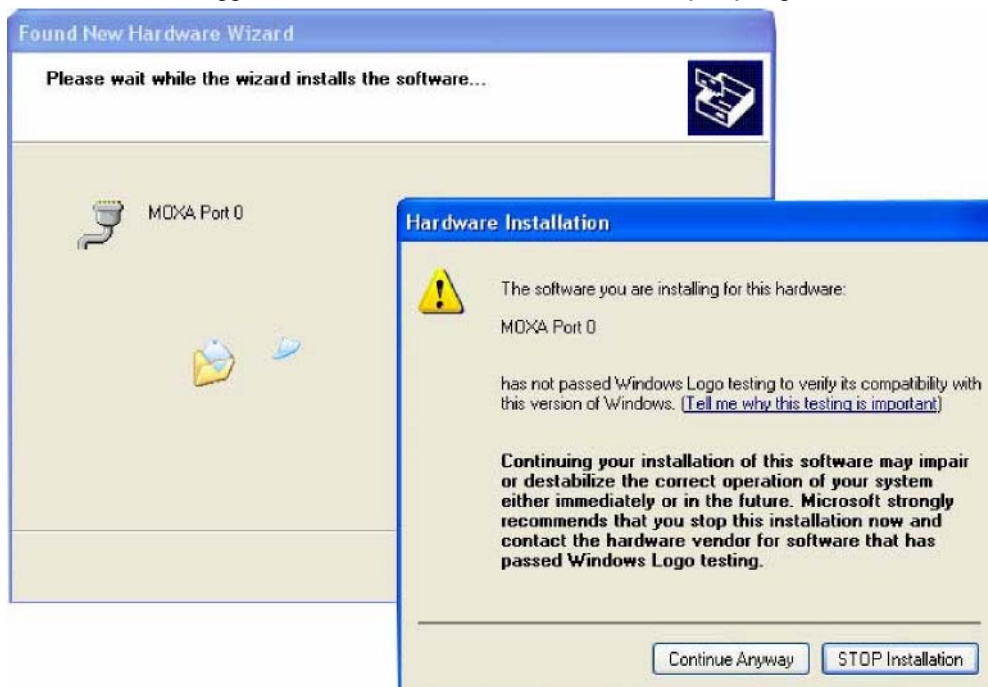
The following figure shows the path for x86.



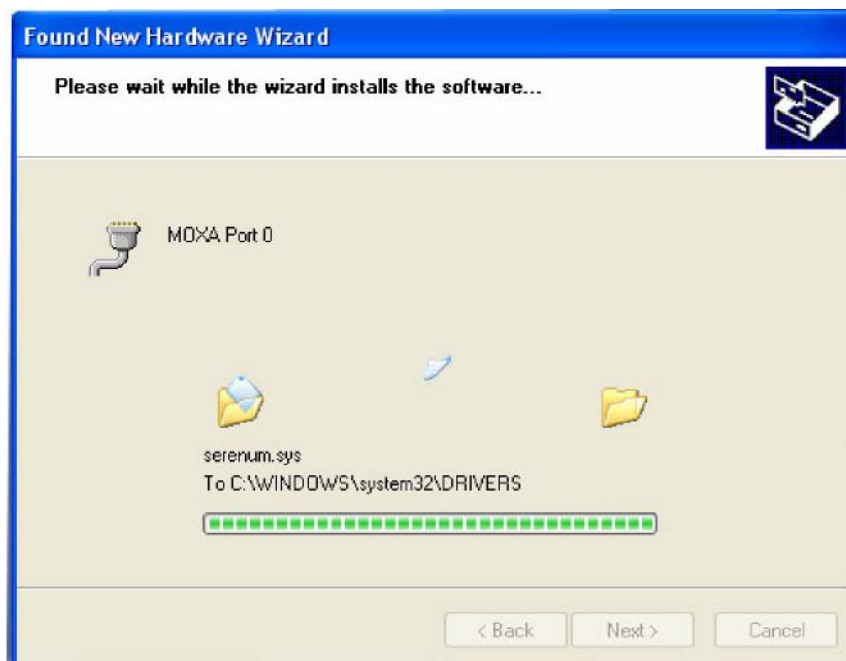
The following figure shows the path for x64.



11. Wait while the installation wizard searches. The next window that opens cautions you that although this software has not passed Windows Logo testing, the driver has been tested and shown that it can support the Windows OS. Click **Continue Anyway** to proceed.



12. Wait while the wizard installs the software.



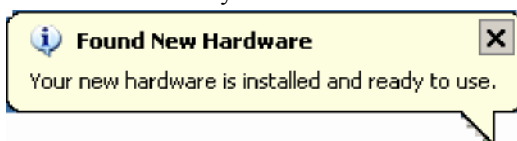
13. After all files have been copied to the system, the **Completing the Found New Hardware Wizard** window will open to indicate that it has finished installing **Port 0**. Click **Finish** to proceed with the rest of the installation.



14. Repeat Step 7 through Step 11 for each of the remaining seven ports. The last port to be installed will be Moxa Port 7, as shown in the following figure.



15. The **Found New Hardware** balloon will reappear to inform you that the hardware was installed successfully.



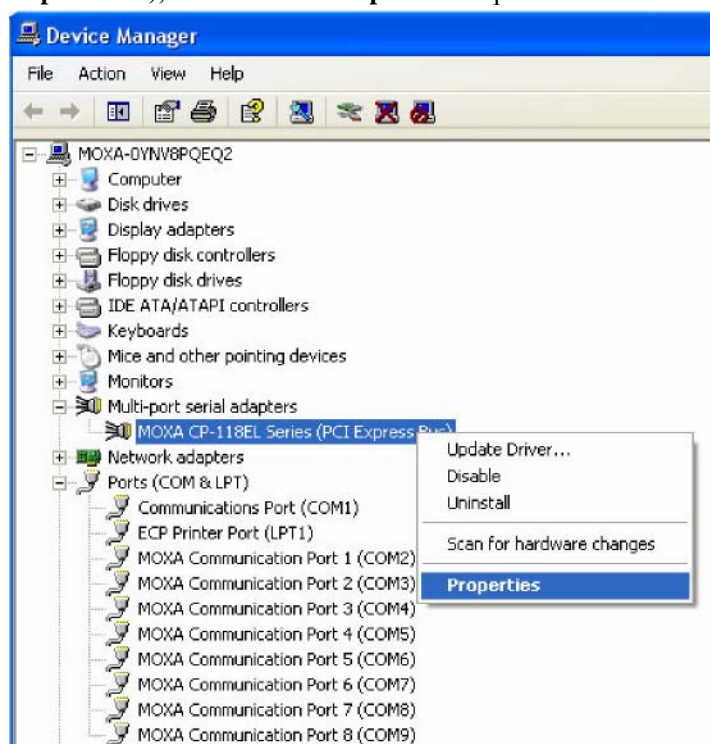
Configuring the Ports

After the driver has been installed, use Device Manager to configure the CP-118EL serial ports.

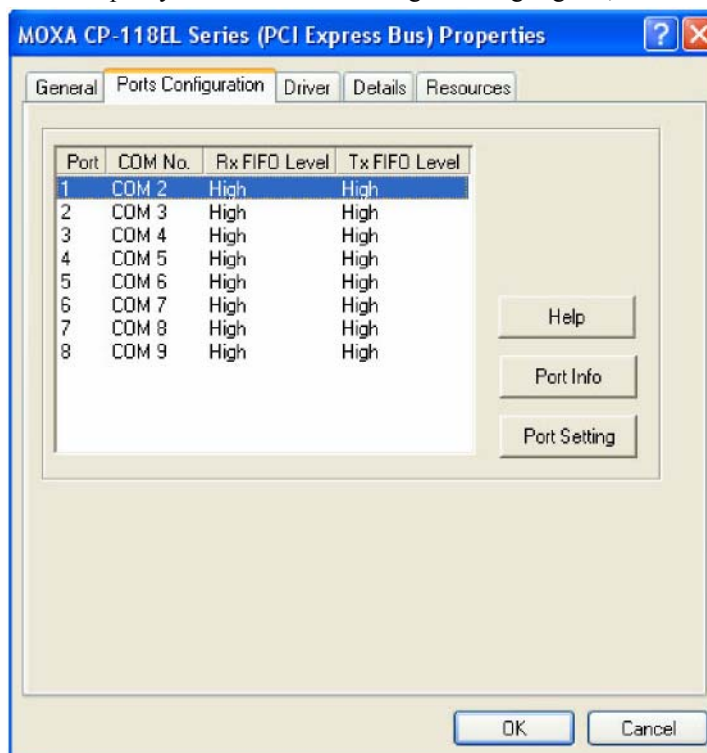
1. Click **Start → Settings → Control Panel → System**, select the **Hardware** tab, and then click **Device Manager**.



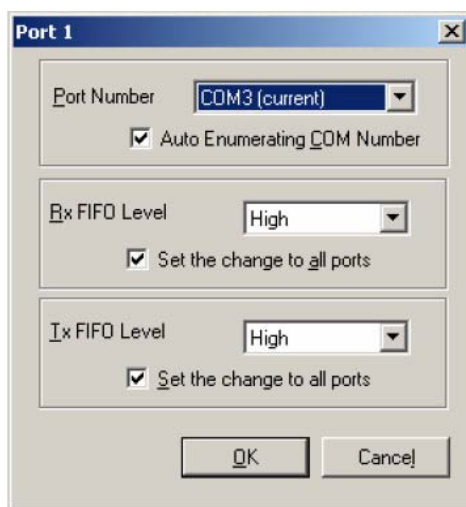
- Expand the **Multi-port serial adapters** tab, right click **Moxa CP-118EL Series (PCI Express Bus)**, and then click **Properties** to open the board's configuration panel.



- Click the port you would like to configure to highlight it, and then click **Port Setting**.



4. Select a COM number for the port from the **Port Number** pull-down list.
5. Select the **Auto Enumerating COM Number** option to map subsequent ports automatically. The port numbers will be assigned in sequence. For example, if COM 3 is assigned to Port 1, then COM 4 (if not already occupied) will be assigned to Port 2, etc.
6. Select an **Rx FIFO Trigger** from the **Rx FIFO Level** pull-down list. Rx FIFO trigger levels of **High**, **Middle**, and **Low** are available, with the default set to High (120 bytes). Select **Set the change to all ports** option to apply this Rx FIFO Trigger to all ports.
7. Select a **Tx FIFO Level** from the **Tx FIFO Level** pull-down list. Tx FIFO Levels of **High**, **Middle**, and **Low** are available, with the default set to High (128 bytes). Select **Set the change to all ports** option to apply the just defined Tx FIFO Size to all ports.



	Tx FIFO	Rx FIFO
High	128	120
Middle	64	60
Low	1	1

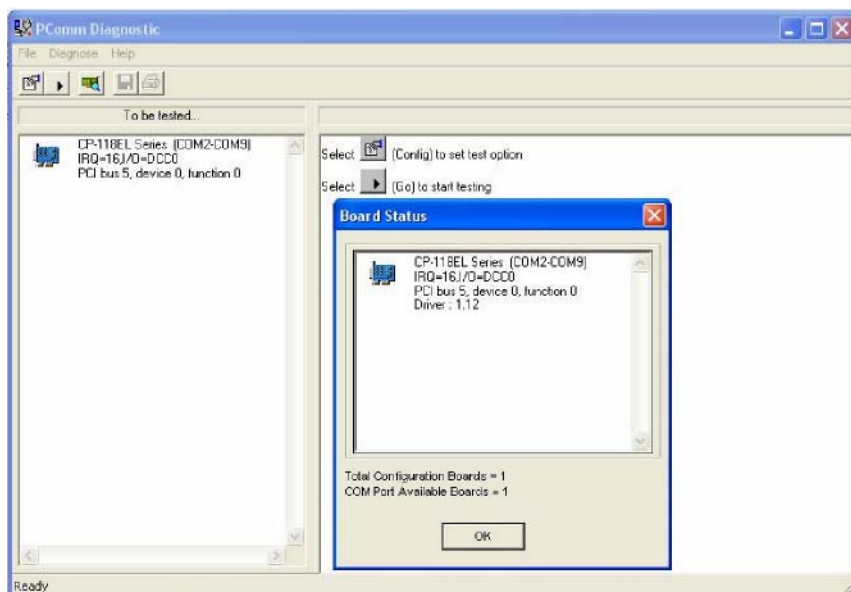
Unit: Bytes

8. Click **OK** to save the port settings, and then click **OK** in the **Property** window to finish the port settings procedure.

Using Moxa PComm Utility

The PComm Diagnostic program is a useful tool for checking the status of Moxa's multiport boards. The program can be used to test internal and external IRQ, Tx/D/RxD, UART, CTS/RTS, DTR/DSR, etc. Use this program to ensure that your Moxa boards and ports are working properly.

To start the program, click **Start → Programs → PComm Lite 2000(XP Ver 1.2) → PComm Diagnostic**.



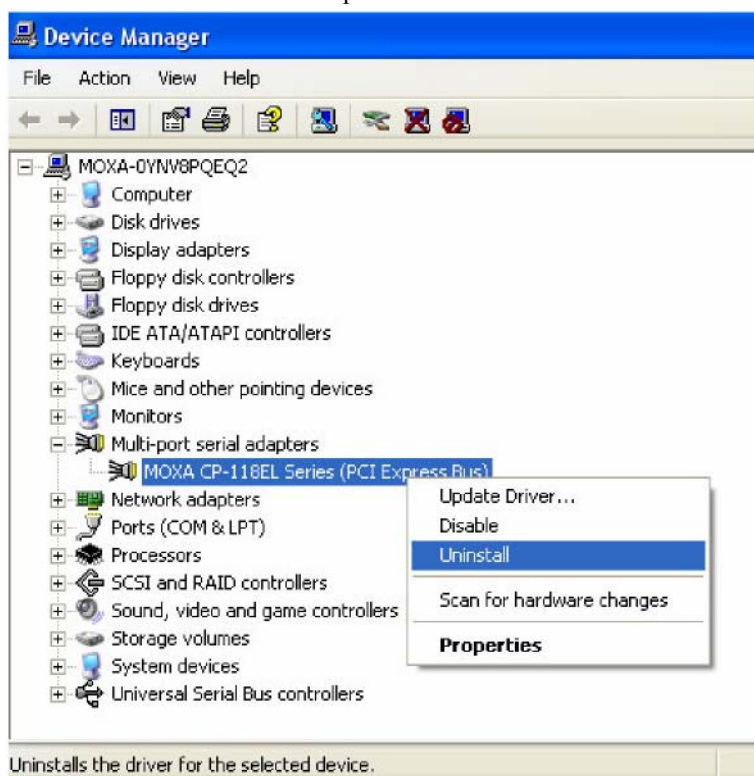
NOTE You can download the PComm Lite software for free from Moxa's website at www.moxa.com/support/free_downloads.htm.

Using Event Log

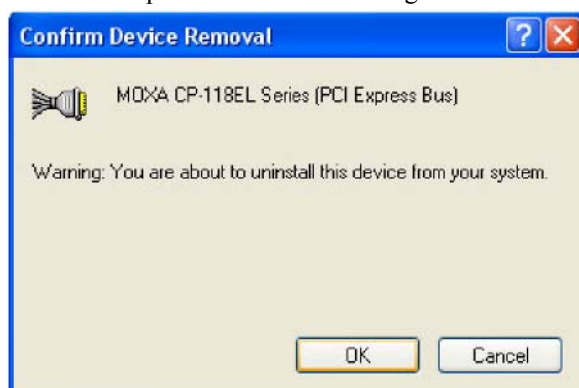
To use the **Event Log** to check the installation of your Moxa boards, click **Start → Settings → Control Panel → Administrative Tools → Event Viewer** to enter the Event Viewer utility. Look under the **System** category to find the latest information relevant to Moxa's drivers.

Removing the Driver

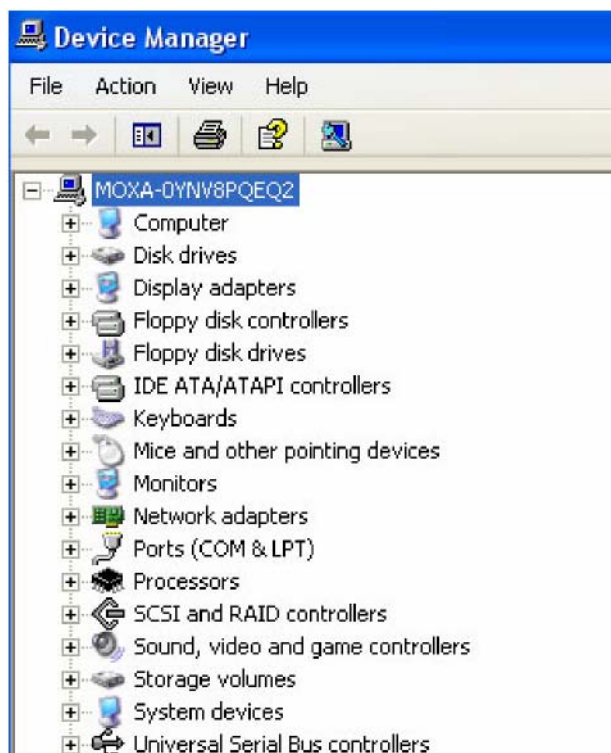
1. To uninstall the driver, click **Start → Settings → Control Panel → System**, select the **Hardware** tab, and then click **Device Manager**. Use the mouse to place the cursor over the CP-118EL Series board under **Multi-port serial adapters**, and then click the right mouse button. Select the **Uninstall...** option.



2. Click **OK** to proceed with uninstalling the board.



3. The **Device Manager** window refreshes automatically, showing that the driver and ports for the CP-118EL Series board have been removed.



Windows 2000

In this section, we describe the installation procedure for Windows 2000.

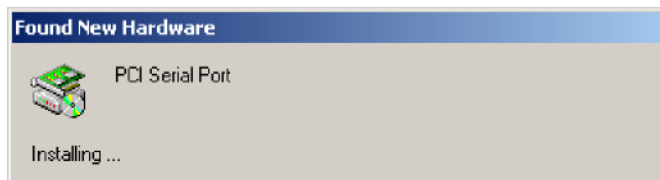
Windows 2000 supports up to 256 serial ports, from COM1 to COM256. In order to utilize fully Windows 2000's multi-process and multi-thread advanced features, pure 32-bit Windows 2000 device drivers were developed for Moxa multiport boards. The drivers conform to the Win32 COMM API standard.

Installing the Driver for the First Time

The following procedure shows how to install the CP-118EL driver for the first time under Windows 2000. First, make sure you have already plugged the board or boards into the system's PCI Express slot(s).

NOTE	If you have already installed a CP-118EL or other Moxa PCI Express board in your computer, and you are installing additional boards, Windows 2000 will automatically detect and install the new board(s) the next time you boot up the computer. In this case, proceed directly to the next section, "Configuring the Ports," to configure the ports' serial transmission parameters.
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1. After plugging the board into an expansion slot and powering on your PC, Windows 2000 will automatically detect the new board, and the **Found New Hardware** window will be displayed for a moment or two.



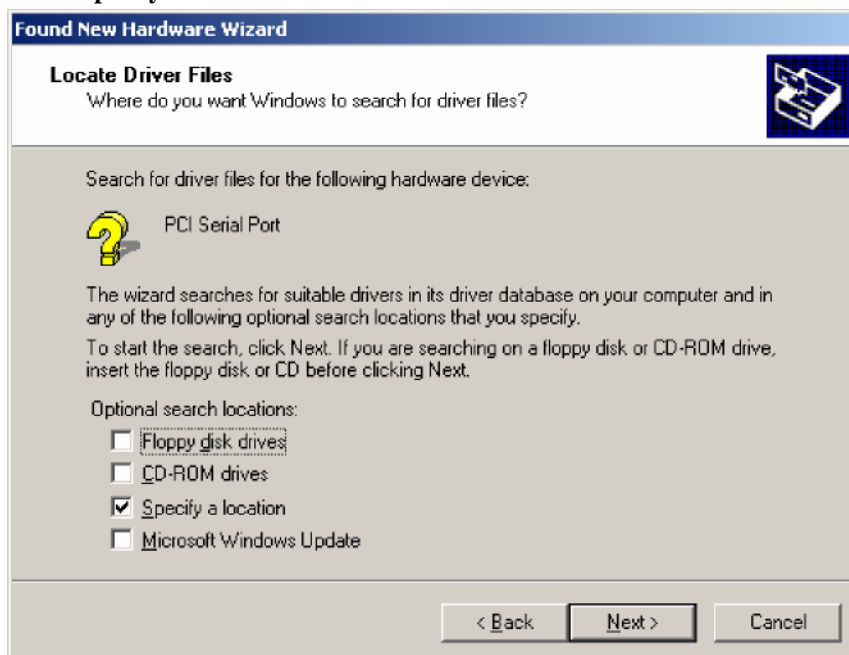
2. When the **Welcome to the Found New Hardware Wizard** window opens, click **Next** to continue.



3. Select **Search for a suitable driver for my device (recommended)**, and then click **Next** to continue.



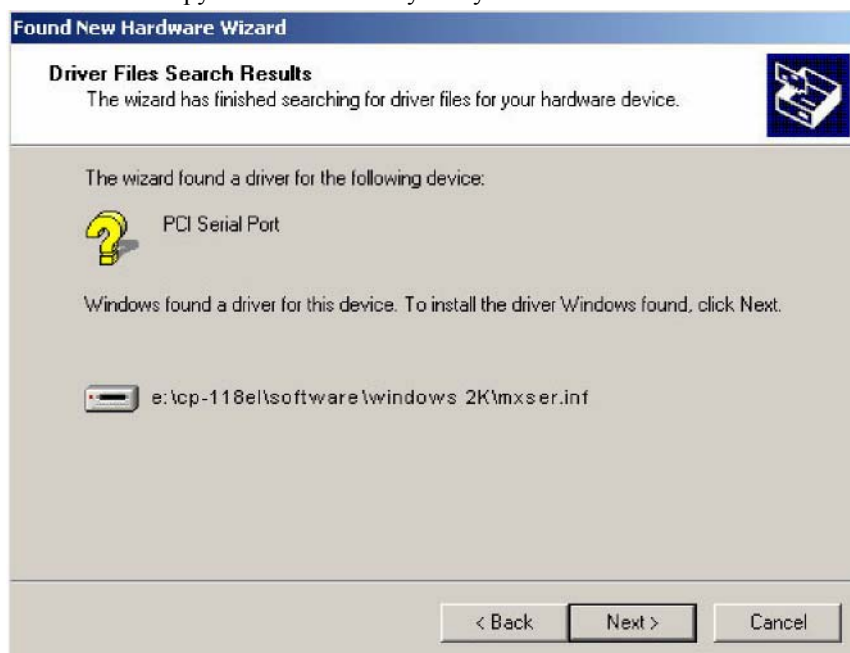
4. Select **Specify a location** and then click **Next** to continue.



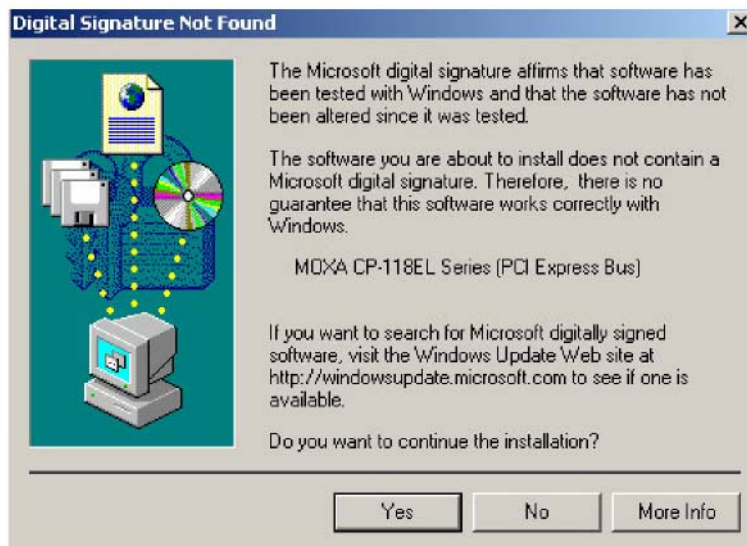
5. Navigate to the **\CP-118EL\Software\Windows 2K** folder on the software CD, and then click **OK** to continue.



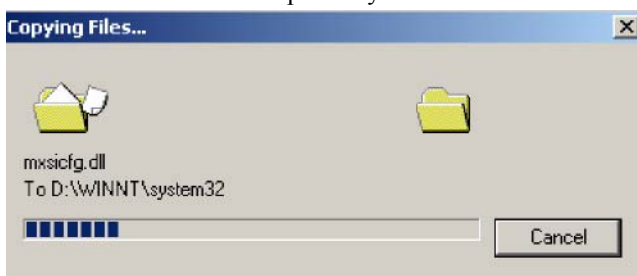
6. Click **Next** to copy the driver files to your system.



7. The next window that opens cautions you that although this software has not passed Windows Logo testing, the driver has been tested and shown that it can support the Windows OS. Click **Yes** to proceed.



8. Wait while the files are copied to your hard drive.



9. The next window shows the model number of the board, and indicates that Windows has completed the driver installation. Click **Finish** to continue with the rest of the installation procedure.



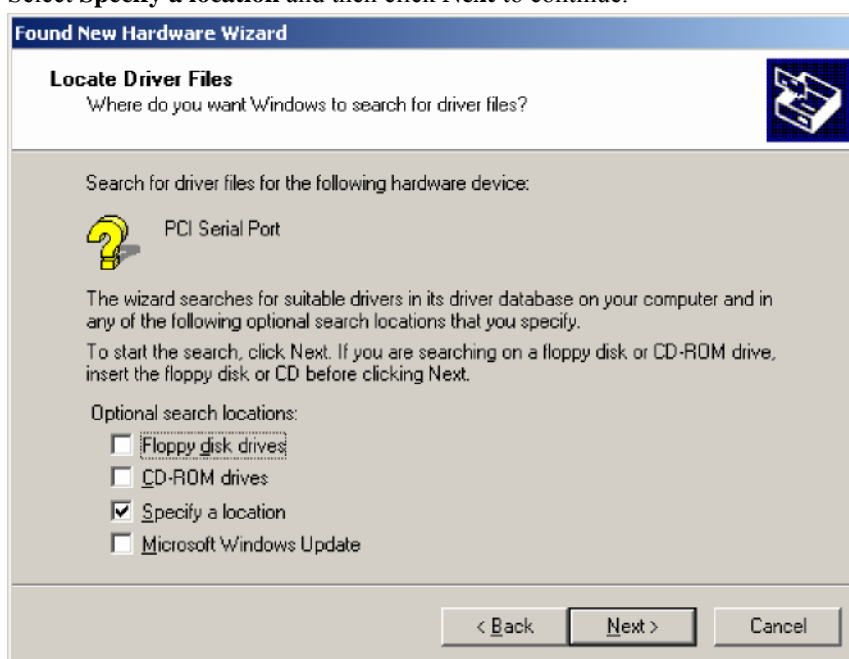
10. The **Found New Hardware** Wizard window will open to help you install the driver for Moxa Port 0. Click **Next** to continue.



11. Select **Search for a suitable driver for my device (recommended)**, and then click **Next** to continue.



12. Select **Specify a location** and then click **Next** to continue.



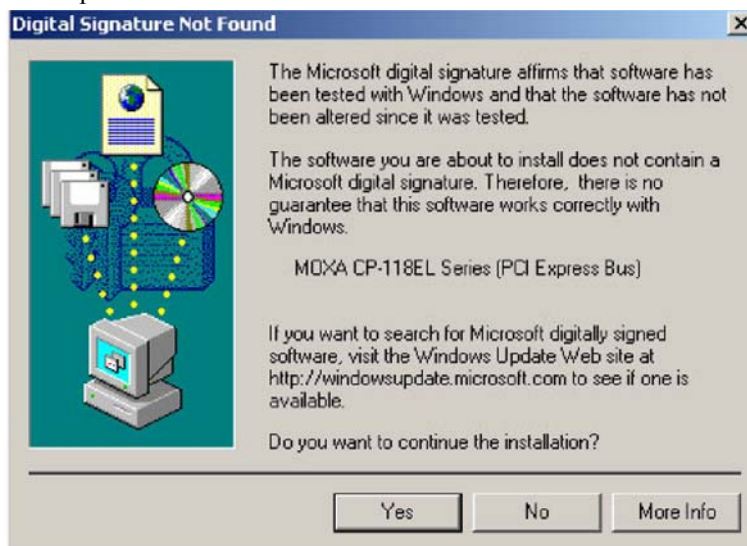
13. Navigate to the \CP-118EL\Software\Windows 2K folder on the software CD, and then click **OK** to continue.



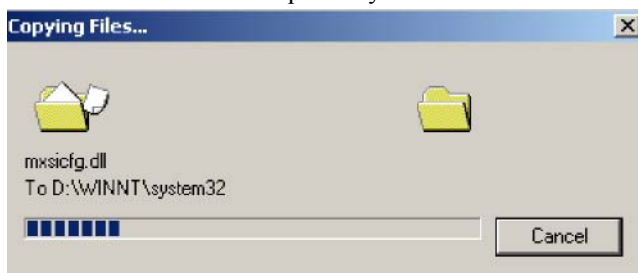
14. Wait while the installation wizard searches.



15. The next window that opens cautions you that although this software has not passed Windows Logo testing, the driver has been tested and shown that it can support the Windows OS. Click **Yes** to proceed.



16. Wait while the files are copied to your hard drive.



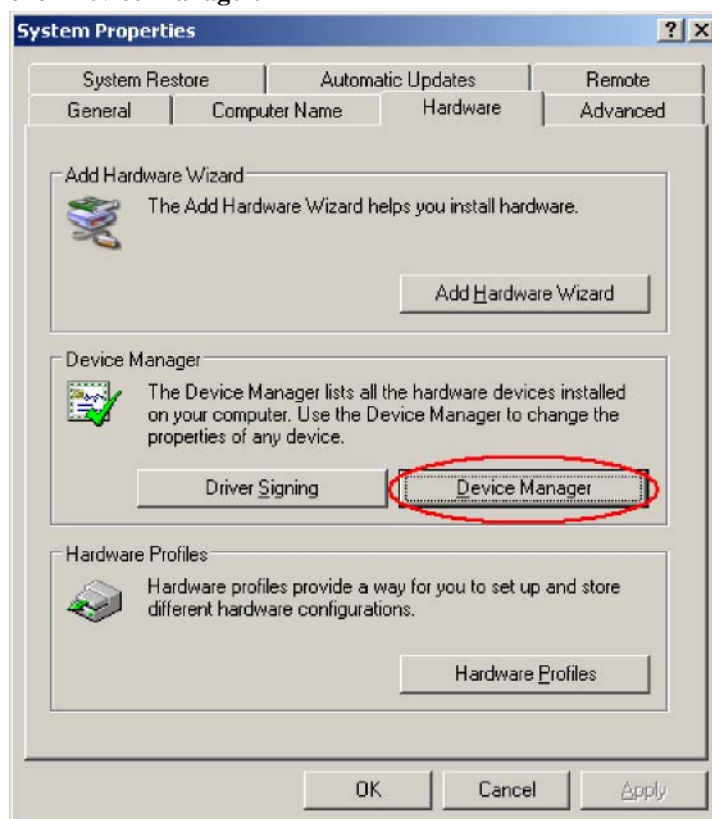
17. After all files have been copied to the system, the **Completing the Found New Hardware Wizard** window will open to indicate that it has finished installing **Port 0**. Click **Finish** to proceed with the rest of the installation.



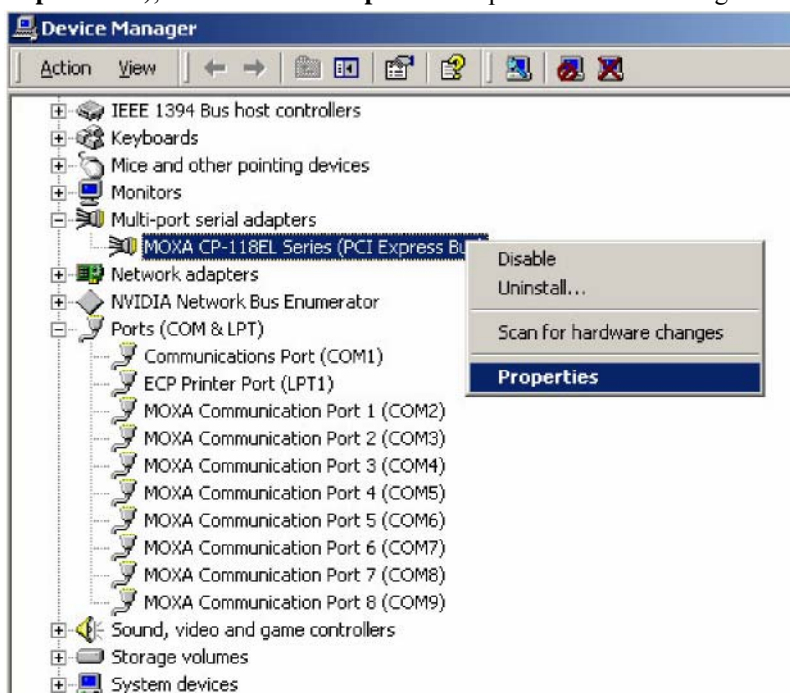
Configuring the Ports

After the driver has been installed, use Device Manager to configure the CP-118EL serial ports.

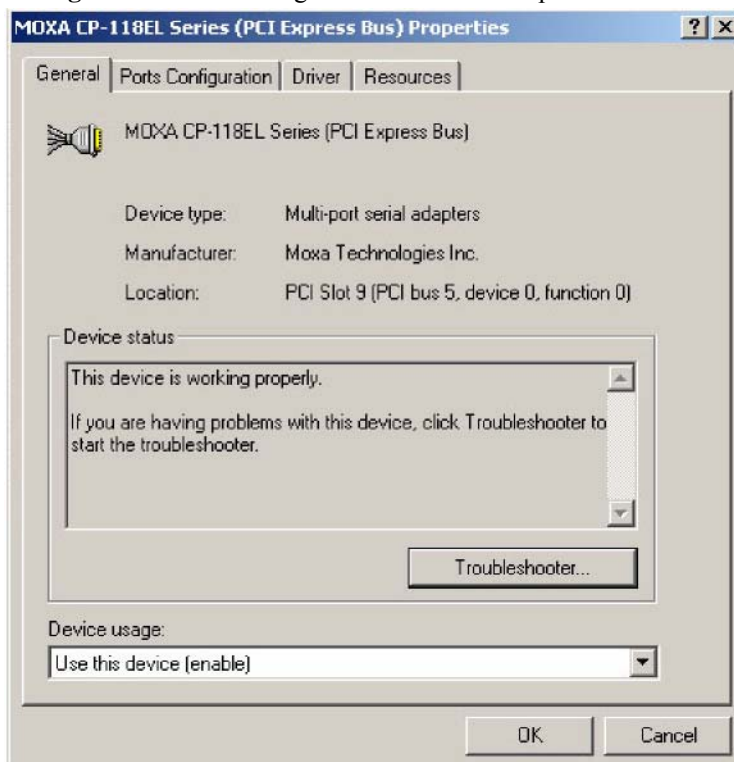
1. Click **Start → Settings → Control Panel → System**, select the **Hardware** tab, and then click **Device Manager**.



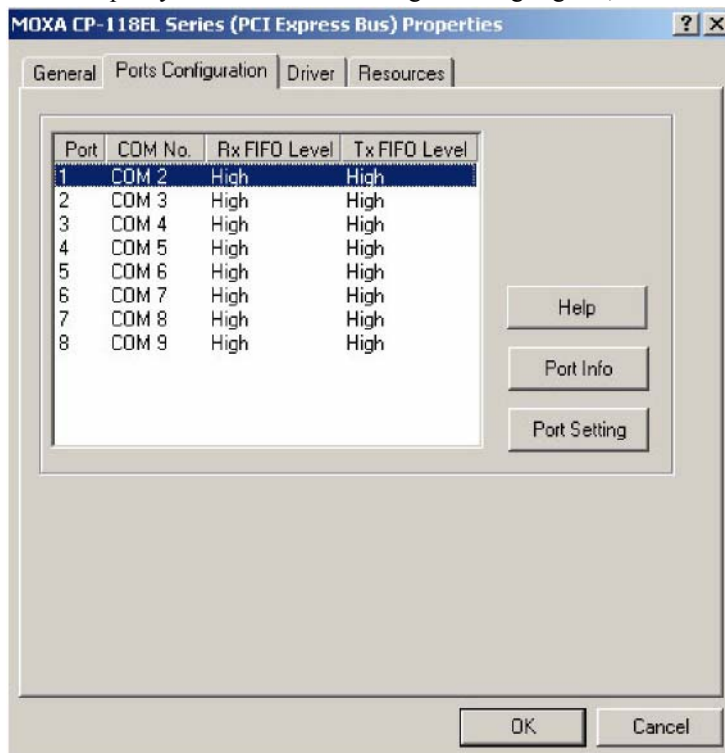
- Expand the **Multi-port serial adapters** tab, right click **Moxa CP-118EL Series (PCI Express Bus)**, and then click **Properties** to open the board's configuration panel.



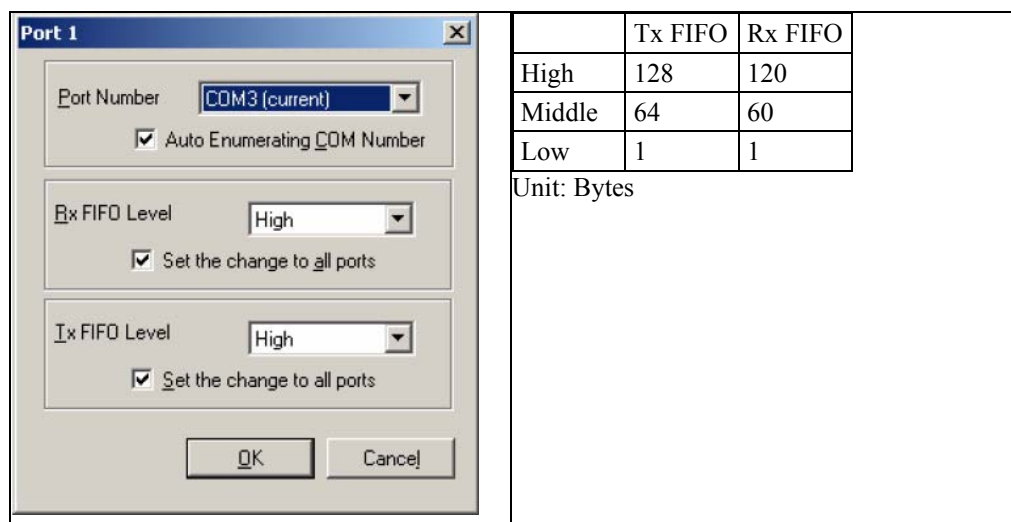
- Basic information about the board is displayed on the **General** page. Click the **Ports Configuration** tab to configure the board's serial ports.



4. Click the port you would like to configure to highlight it, and then click **Port Setting**.



5. Select a COM number for the port from the **Port Number** pull-down list.
6. Select the **Auto Enumerating COM Number** option to map subsequent ports automatically. The port numbers will be assigned in sequence. For example, if COM 3 is assigned to Port 1, then COM 4 (if not already occupied) will be assigned to Port 2, etc.
7. Select an **Rx FIFO Trigger** from the **Rx FIFO Level** pull-down list. Rx FIFO trigger levels of **High**, **Middle**, and **Low** are available, with the default set to High (120 bytes). Select **Set the change to all ports** option to apply this Rx FIFO Trigger to all ports.
8. Select a **Tx FIFO Level** from the **Tx FIFO Level** pull-down list. Tx FIFO Levels of **High**, **Middle**, and **Low** are available, with the default set to High (128 bytes). Select **Set the change to all ports** option to apply the just defined Tx FIFO Size to all ports.

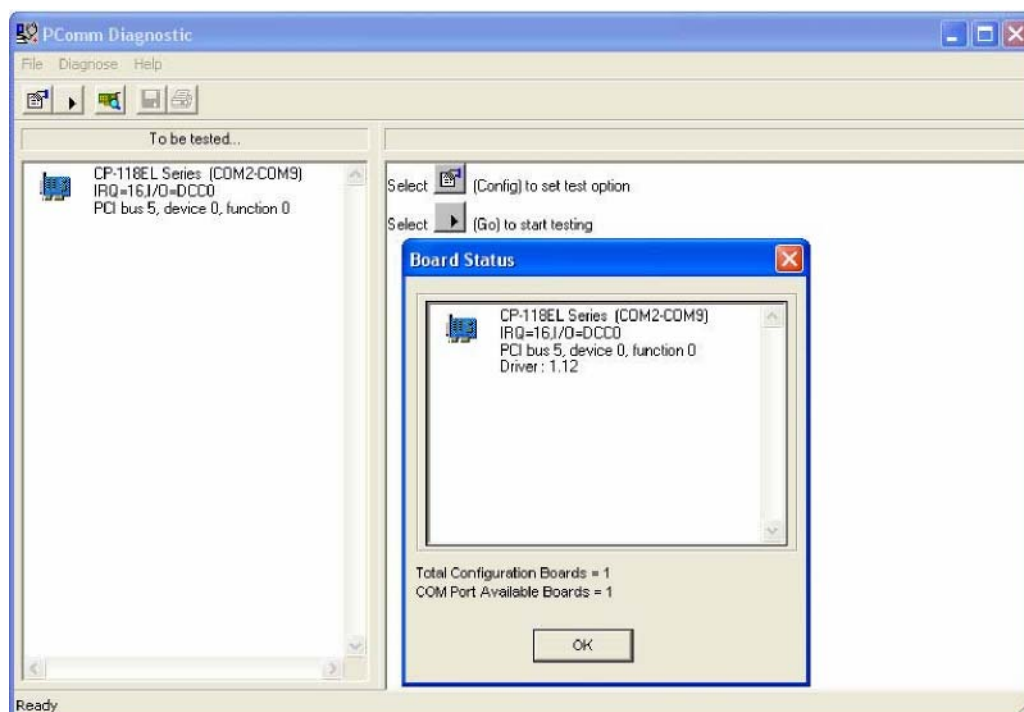


9. Click **OK** to save the port settings, and then click **OK** in the **Property** window to finish the port settings procedure.

Using Moxa PComm Utility

The PComm Diagnostic program is a useful tool for checking the status of Moxa's multiport boards. The program can be used to test internal and external IRQ, TxD/RxD, UART, CTS/RTS, DTR/DSR, etc. Use this program to ensure that your Moxa boards and ports are working properly.

To start the program, click **Start → Programs → PComm Lite 2000(XP Ver 1.2) → PComm Diagnostic**.



NOTE You can download the PComm Lite software for free from Moxa's website at

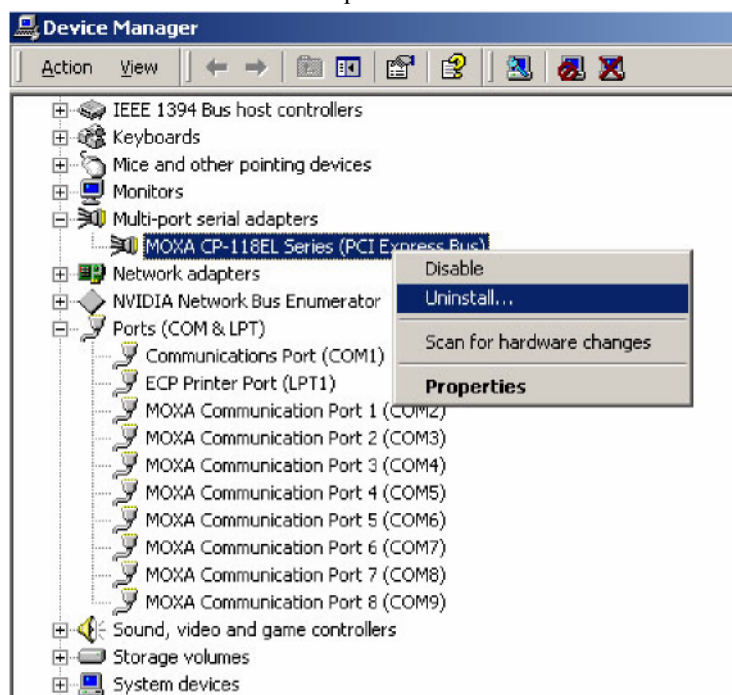
www.moxa.com/support/free_downloads.htm.

Using Event Log

To use the **Event Log** to check the installation of your Moxa boards, click **Start → Settings → Control Panel → Administrative Tools → Event Viewer** to enter the Event Viewer utility. Look under the **System** category to find the latest information relevant to Moxa's drivers.

Removing the Driver

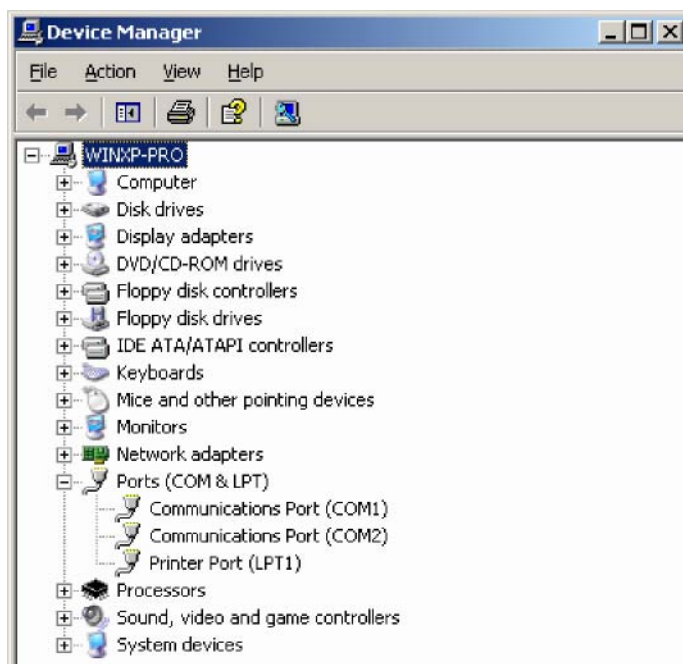
1. To uninstall the driver, click **Start → Settings → Control Panel → System**, select the **Hardware** tab, and then click **Device Manager**. Use the mouse to place the cursor over the CP-118EL Series board under **Multi-port serial adapters**, and then click the right mouse button. Select the **Uninstall...** option.



2. Click **OK** to proceed with uninstalling the board.



3. The **Device Manager** window refreshes automatically, showing that the driver and ports for the CP-118EL Series board have been removed.



Non-Windows Drivers

Drivers are provided for DOS, Linux, and SCO.

DOS

Moxa DOS API-232 is a software package that assists users in developing new programs, or debugging existing programs for serial communications. This section explains how to install the package, how to set up the driver, and how to load or unload the driver.

Moxa provides drivers that allow you to use the following serial board products under DOS:

- **PCI Express Boards:** CP-118EL, CP-168EL, CP-104EL.
- **Universal PCI Boards:** CP-118U, CP-168U, CP-104UL, CP-104JU, CP-102U, CP-102UL, CP-134U, CP-134U-I, CP-132UL, CP-132UL-I V2(CP-132U-I V1)
- **PCI Boards:** C168H/PCI, C104H/PCI, C104HS/PCI, CP-114, CP-114I, CP-114S, CP-114IS, CP-132, CP-132I, CP-132S, CP-132IS
- **ISA Boards:** C168H, C168HS, C168P, C104H, C104HS, C104P, CI-104J, CI-104JS, CI-134, CI-134I, CI-134IS, CI-132, CI-132I, CI-132IS
- **cPCI Boards:** CT-114I



WARNING

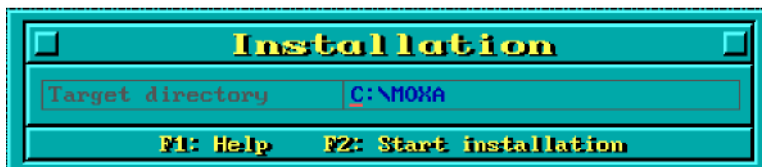
If you are using a Serial ATA HDD under DOS, the installation process will also hang. In this case, change your HDD to IDE drive.

NOTE

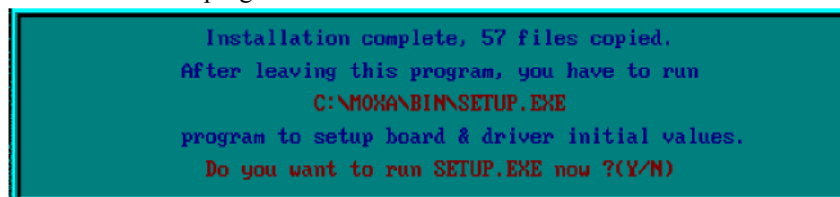
The following procedure shows how to install the CP-168EL driver under DOS.

Installing the Driver

1. Run the installation program, **DOSINST.EXE** from the **\Software\DOS** folder on the Documentation and Software CD. Specify the target API-232 directory (e.g. C:\Moxa) to which the driver will be copied. Press F2 to start the installation.



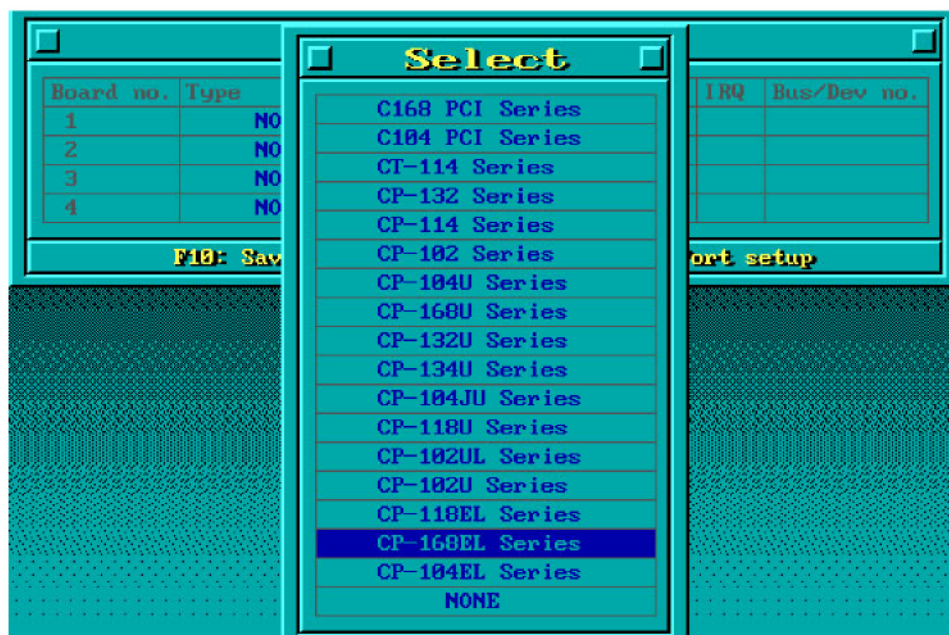
2. After the installation is complete, a window will open to ask if you want to run **SETUP.EXE**. Press **Y** to run the program.



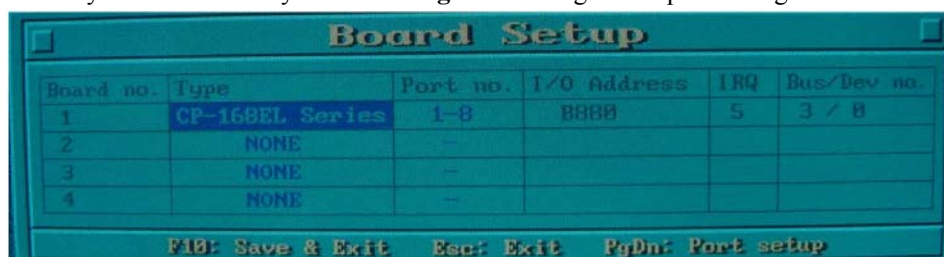
Setting up the Driver

This section covers some of the setup program's most frequently used functions. For complete details, press F1 to open the on-line help file.

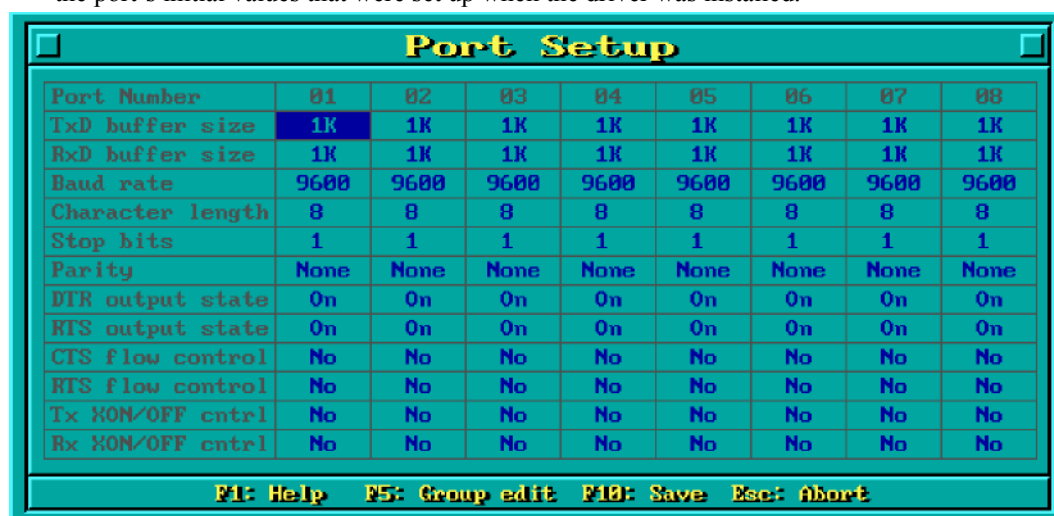
1. Run **BIN\SETUP.EXE**.
2. Press **Enter** to select the model name of the Moxa board you are installing.



3. A window will open displaying basic configuration information for all boards of this type currently installed in the system. Press **PgDn** to configure the port settings.



4. You may enter or modify the settings of each port at this stage. The values displayed first are the port's initial values that were set up when the driver was installed.



5. Press **F10** to save the changes and exit the SETUP program.

Legends

In this section, we explain the meaning of some of the fields and functions.

Port number

This is the ID of the port. Application software uses port number (ID) when referring to a port. You can set the port numbers to any number between 0 and 255 (inclusive). However, you must ensure that you assign each port a unique port number. If you are developing your own application software, then you may want to select port numbers that take into consideration the structure of the program.

TxD buffer size

The TxD buffer is the transmission (output) buffer allocated by the system for each port.

RxD buffer size

The RxD buffer is the receiving (input) buffer allocated by the system for each port.

F5 Group Edit

This convenient function allows you to edit the configuration of several ports at one time as a group.



Loading the Driver

After completing the setup procedure, run **BIN\DP-DRV.EXE** from the DOS prompt to load the driver. The driver will automatically detect the boards that have already been installed. If one or more boards are detected, you will see a message similar to the following:

```
Smartio/Industio Family DOS driver Version 1.7
Setup driver ...
CP-168EL series (Bus= x ,Dev=y) : OK!
Device driver setup O.K.
```

This indicates that the CP-168EL Series driver has been installed properly. At this point, you may execute applications that support API-232 functions, or start developing applications using the API-232 library.

Unloading the Driver

To unload (release) the driver from memory, type **DP-DRV/Q** at the DOS prompt and then press **Enter**.

Linux (32-bit/64-bit)

Moxa provides drivers that allow you to use the following serial board products under Linux.

- **PCI Express Boards:** CP-118EL, CP-168EL, CP-104EL.
- **Universal PCI Boards:** CP-118U, CP-168U, CP-104UL, CP-104JU, CP-102U, CP-102UL, CP-134U, CP-134U-I, CP-132UL, CP-132UL-I V2(CP-132U-I V1)
- **PCI Boards:** C168H/PCI, C104H/PCI, C104HS/PCI, CP-114, CP-114I, CP-114S, CP-114IS, CP-132, CP-132I, CP-132S, CP-132IS
- **ISA Boards:** C168H, C168HS, C168P, C104H, C104HS, C104P, CI-104J, CI-104JS, CI-134, CI-134I, CI-134IS, CI-132, CI-132I, CI-132IS
- **cPCI Boards:** CT-114I

NOTE The following procedure shows how to install the CP-118EL driver under Linux.

Execute the following commands from the Linux prompt:

1.

```
#mount /dev/cdrom /mnt/cdrom
#cd /
#mkdir moxa
```
2.

```
#cd moxa
#cp /mnt/cdrom/<driver directory>/mxser.tgz.
```
3.

```
#tar xvfz mxser.tgz
```
4.

```
#cd mxser
#make clean; make install
```
5.

```
#cd /moxa/mxser/driver
#./msmkod
```
6.

```
#modprobe mxser
```

(If you install ISA Boards, use the command `# insmod mxser ioaddr=0x???, 0x???, 0x???, 0x???` ← 1st ISA, 2nd ISA, 3rd ISA, 4th ISA)
 Using `/lib/modules/2.4.20-8/kernel/drivers/char/mxser.o`
 Warning: loading `/lib/modules/2.4.20-8/kernel/drivers/char/mxser.o` will taint the kernel: no license
 See <http://www.tux.org/lkml/#export-tainted> for information about tainted modules Moxa Smartio/Industio family driver version 1.9
 Tty devices major number = 30, callout devices major number = 35
 Found Moxa CP-118EL series board (BusNo=2,DevNo=1 3)
 Module mxser loaded, with warnings
7. Use the Moxa diagnostics utility to verify the driver status:


```
#cd /moxa/mxser/utility/diag
#./msdiag
= Moxa Smartio/Industio Family Multiport Board Status Utility(1.1)=
Tty Device Major Number= 30.
Callout device Major Number= 35.
Board 1 : CP-118EL series (BusNo=2, DevNo=13)
Port 1: 0xac00, max. baudrate = 921600 bps.
Port 2: 0xac08, max. baudrate = 921600 bps.
Port 3: 0xac10, max. baudrate = 921600 bps.
Port 4: 0xac18, max. baudrate = 921600 bps.
Port 5: 0xac20, max. baudrate = 921600 bps.
Port 6: 0xac28, max. baudrate = 921600 bps.
Port 7: 0xac30, max. baudrate = 921600 bps.
Port 8: 0xac38, max. baudrate = 921600 bps.
```
8. Use the Moxa terminal utility to test the tty ports:


```
#cd /moxa/mxser/utility/term
#./msterm
```


SCO

Moxa provides drivers that allow you to use the following serial board products under SCO Unix.

- **PCI Express Boards:** CP-118EL, CP-168EL, CP-104EL.
- **Universal PCI Boards:** CP-118U, CP-168U, CP-104UL, CP-104JU, CP-102U, CP-102UL
- **PCI Boards:** C168H/PCI, C104H/PCI, C104HS/PCI
- **ISA Boards:** C168H, C168HS, C168P, C104H, C104HS, C104P, CI-104J, CI-104JS

Follow the steps given in this section to install the SCO driver. Note that the SCO driver provided by Moxa only supports RS-232. Consequently, the SCO driver will only work with CP-118U ports that are configured for RS-232. Moxa provides drivers for the following versions of SCO:

- **SCO OpenServer**
- **SCO UnixWare 7**
- **SCO UnixWare 2.1**

The following steps are for installing the driver under SCO OpenServer. The installation procedures for SCO UnixWare 7 and SCO UnixWare 2.1 are similar.

1. Copy the driver file .tar to your host.
2. `#tar xvf <driver tar file>
/tmp/moxa/mxinstall
/tmp/moxa/sco.tar`
3. `# cd/tmp/mxinstall
./mxinstall`
4. The window shown below will open next. Press any key to continue.

```
=====
Copyright© 2008 Moxa Inc.
All Rights Reserved.
```

```
Moxa Smartio Family Device Driver Installation (Ver. 1.8)
=====
```

```
For SCO UNIX System V/386 Release 3.2
```

```
Tar files, please wait.....O.K.
```

```
Press any key to continue
```

5. The **Basic Configuration** window will open next. You can install up to four Moxa Smartio Multiport Serial Boards under SCO Unix/SCO Open Server.

Moxa Smartio Family Installation Utility (Ver 1.8)				
Smartio Family Basic Configuration				
Board No.	Board Type	I/O Address	Interrupt	Bus/Dev No.
1	None	-----	-----	-----
2	None	-----	-----	-----
3	None	-----	-----	-----
4	None	-----	-----	-----
PgDn: getty Setting Esc: Exit Enter: Confirm Input Value Tab: Change Item				

6. Press Enter to select the Moxa Multiport Serial Board you installed. For example, select "CP-118EL" and then press **Enter**.

None
C168 ISA Series
C104 ISA Series
C168 PCI Series
C104 PCI Series
CI-104J Series
CP-102 Series
CP-104U Series
CP-168U Series
CP-104JU Series
CP-118U Series
CP-102UL Series
CP-102U Series
CP-118EL Series
CP-168EL Series
CP-104EL Series

7. The board's basic information, such as I/O address, Bus No., and Device No., will be shown next. The SCO system will assign the resources to the PCI Express board you selected.

PCI Express Boards Selecting		
1	I/O Addr= AC00, BusNO=2	DevNo=13
Enter: Select		ESC: Exit

8. Press **Enter** to return to the main screen.

Smartio Family Installation Utility (Ver 1.8)				
Smartio Family Basic Configuration				
Board No.	Board Type	I/O Address	Interrupt	Bus/Dev No.
1	CP-118EL	AC00	5	2/13
2	None	-----	-----	-----
3	None	-----	-----	-----
4	None	-----	-----	-----
PgDn: getty Setting Enter: Confirm Input Value			Esc: Exit Tab: Change Item	

9. Press **Esc** to save the configuration and exit.

Save configuration changes? (Y/N)

10. The driver files will be copied to the SCO system. Press any key to continue.

-----[Message]-----
Copying driver files and configuring system. Please wait....
Press any key to continue! _

11. Press **Y** to rebuild the system.

-----[Message]-----
Do you want to rebuild the system? (y/n)_

12. The following window will open next.

-----[Message]-----
Do you want to rebuild the system? (y/n)_
Rebuilding kernel. Please wait....

13. After the system is rebuilt, the system will return to shell command. And you should manually reboot your system then you can begin to use your Moxa Smartio Multiport Serial Board.

-----[Message]-----
Do you want to rebuild the system? (y/n)_
Rebuilding kernel. Please wait....
Rebuilding kernel completed.
Please remember to manually reboot your system later.
Press any key to continue. _

Windows CE 5.0

In this section, we explain how to install Moxa PCI Express boards under WinCE 5.0. These instructions are intended for users who are familiar with the Windows CE Platform Builder 5.0 Toolkit, and would like to install one or more Moxa Tech products. Here, we only give the step-by-step installation instructions for the development environment. You will need to download the image file to the target host yourself.

The WinCE 5.0 driver for the Moxa PCI Express Multiport Serial Module supports the following products:

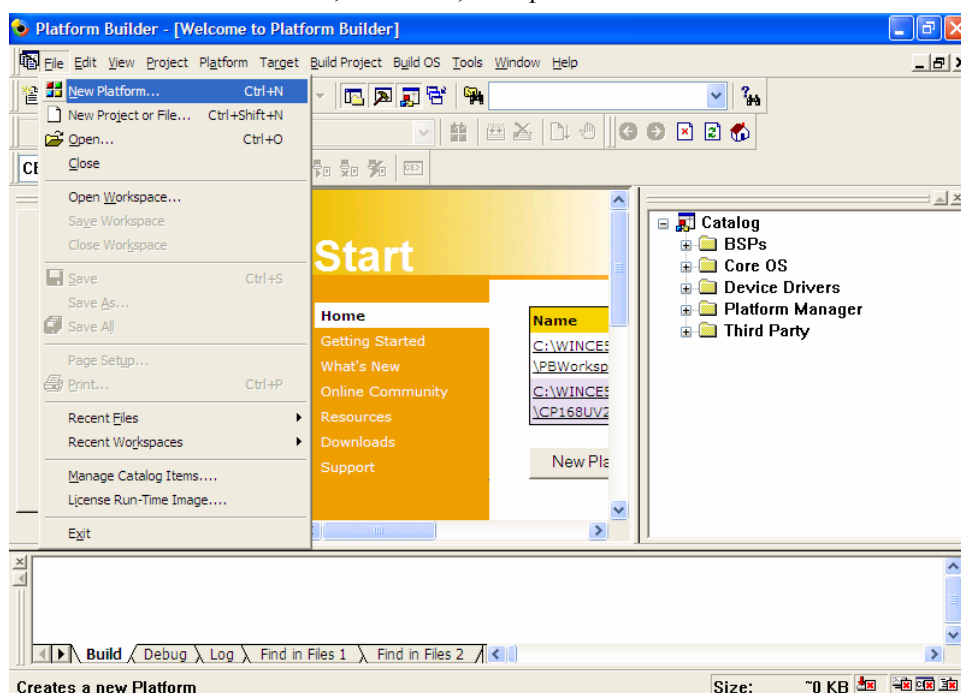
- PCI Express: CP-118EL, CP-168EL and CP-104EL

The CP-104EL board is used to illustrate the installation procedure.

Installing the driver

The following procedure explains how to install the CP-104EL multiport serial module driver under WinCE.

1. Obtain a copy of Moxa Tech WinCE 5.0 driver package and extract it to your computer. Double click the Install package to copy the **Mxser** folder to %WINCEROOT%\PLATFORM\ automatically, and import the supported Moxa Tech products into the **Folder**.
2. Start WinCE Platform Builder, select **File**, and open **New Platform**.



3. Enter a Name for Workspace and press **Next**.

New Platform Wizard - Step 2

Workspace Name And Location
Choose a friendly name for your workspace.

Name:
Test1

Path:
E:\WINCE500\PBWorkspaces\Test1\

< Back Next > Finish Cancel

4. When you see **Board Support Packages, Design Template, Applications & Media, Networking & Communications, OBEX Server**, select what you need to build your own environment. The **Completing the New Platform Wizard** window will open to indicate that it has finished creating a new platform. Click **Finish** to complete the setup.

New Platform Wizard - Step 4

Design Template
A design template is a pre-defined selection of Catalog items.

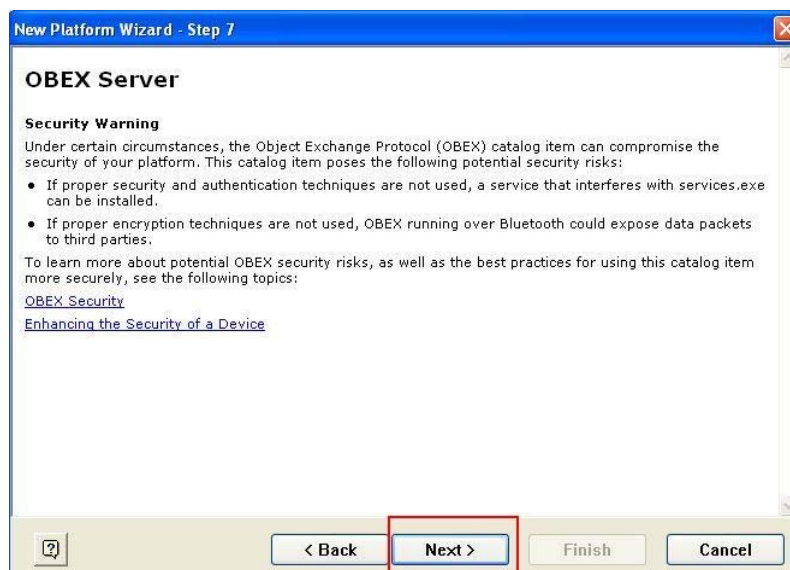
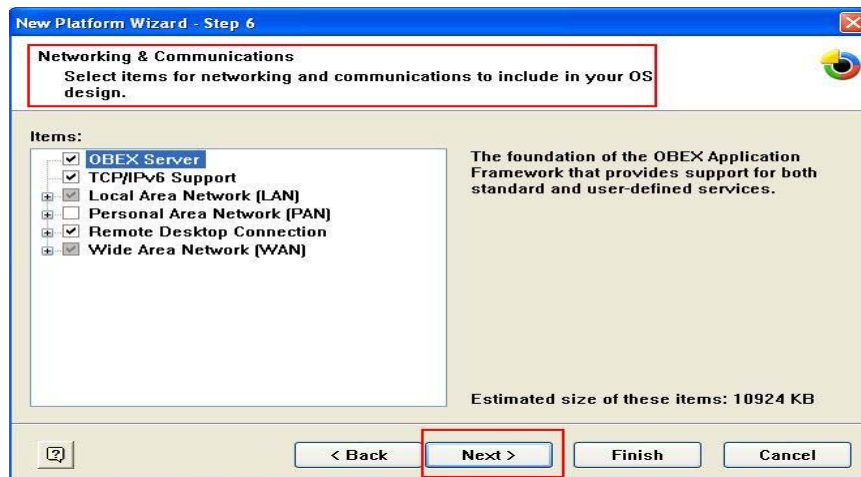
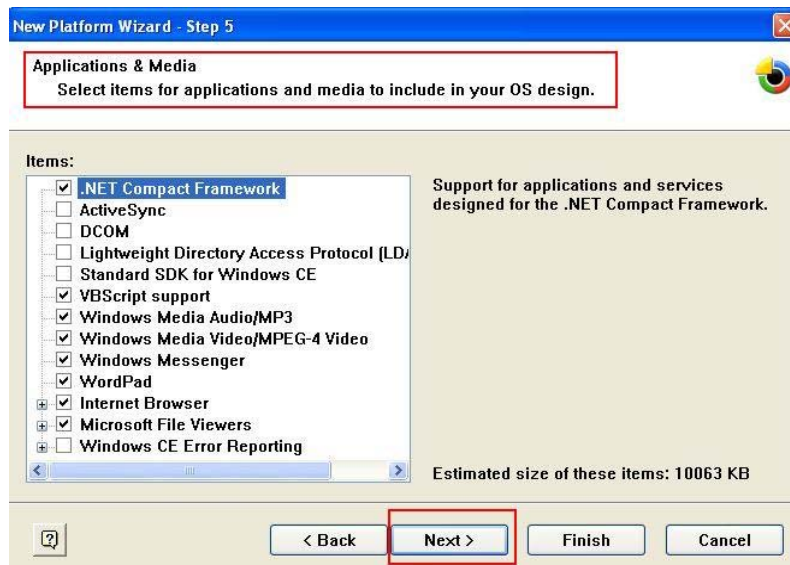
Available design templates:

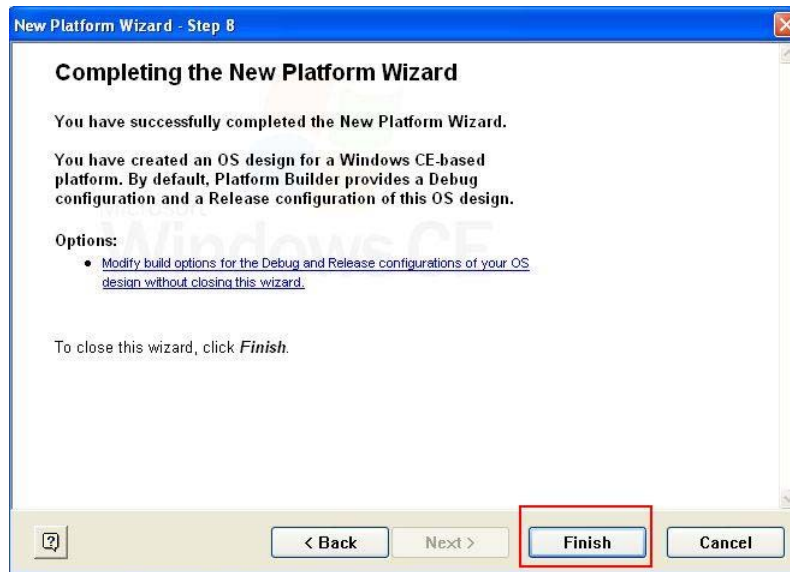
- Custom Device
- Digital Media Receiver
- Enterprise Terminal
- Enterprise Web Pad
- Gateway
- Industrial Controller
- Internet Appliance
- IP Phone
- Mobile Handheld
- Set-Top Box
- Tiny Kernel
- Windows Thin Client

Choose the design template that is most closely aligned with the purpose of your target device.

Provides the starting point for a range of Web Pad-based devices with touch display and wireless networking.

< Back Next > Finish Cancel

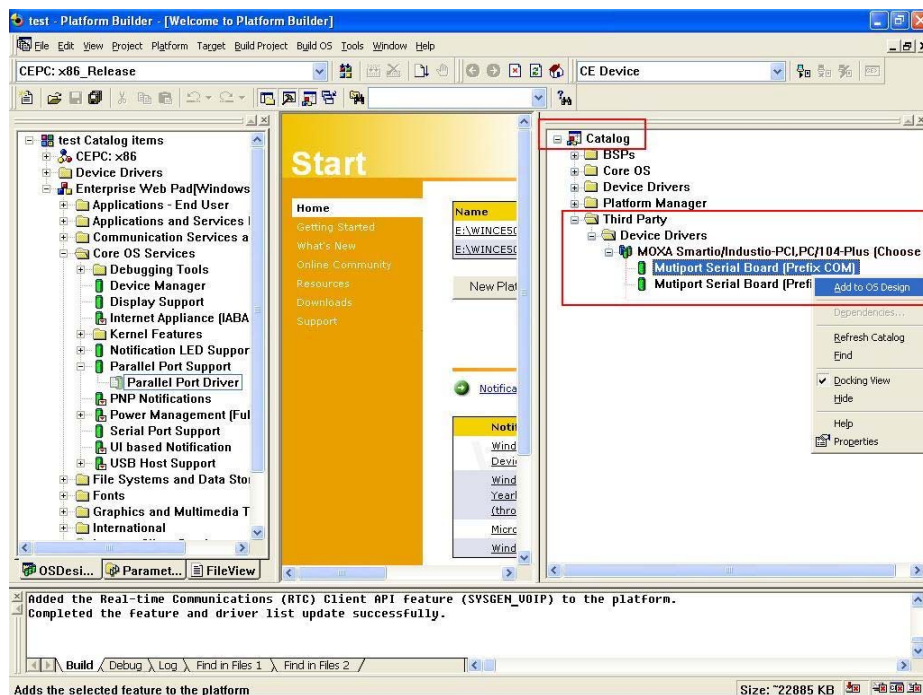




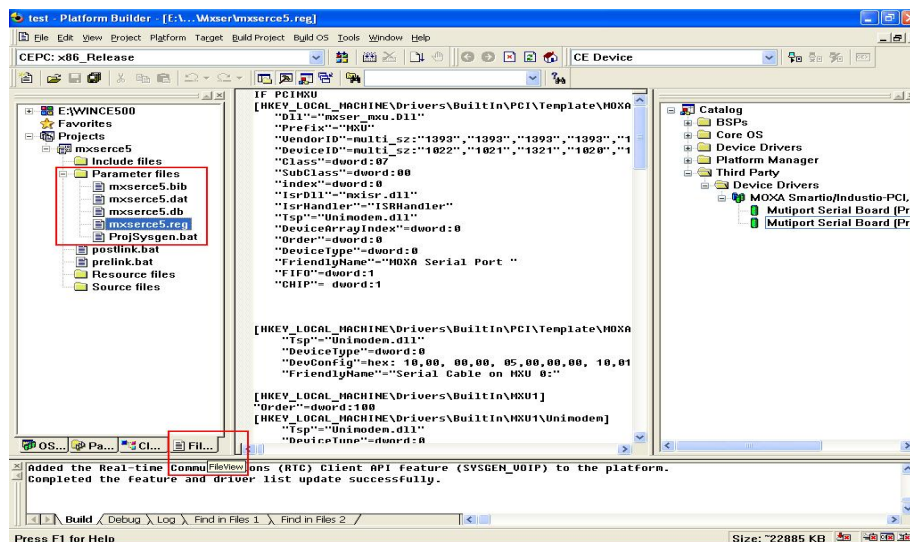
5. Open Manage Catalog Items (**File → Manage Catalog Items**). In the Catalog (**View → Catalog**), browse to **\Third Party\Device Drivers\ Moxa Smartio/Industio-PCI, PC/104-Plus**. Right-click on the driver **Prefix COM** or **Prefix MXU** you would like to include and choose **Add to OS Design**.

Note: You can only select either **Prefix COM** or **Prefix MXU**, but not both.

Prefix COM supports up to 10 ports, from COM0 to COM9. Prefix MXU supports more than 10 ports, so it is better for you to select Prefix MXU if you are not sure how many ports the device has. Otherwise, you will only be allowed to use one multiport serial board on the target host.



- After adding Moxa Tech drivers into your **OS Design**, a new project is automatically added to your workspace. The project name is **mxserce5**. The project can be accessed from File View (**View → File View**). The **mxserce5** project contains a number of files used to configure the drivers included in your **OS Design**.



Note: If you would like to use “Terminal Emulator” tool, please modify **mxserce5.reg** and keyboard like below (This is only just for “one” “COM” port). You have to notice number of ports, COM, MXU and enter the correct information.

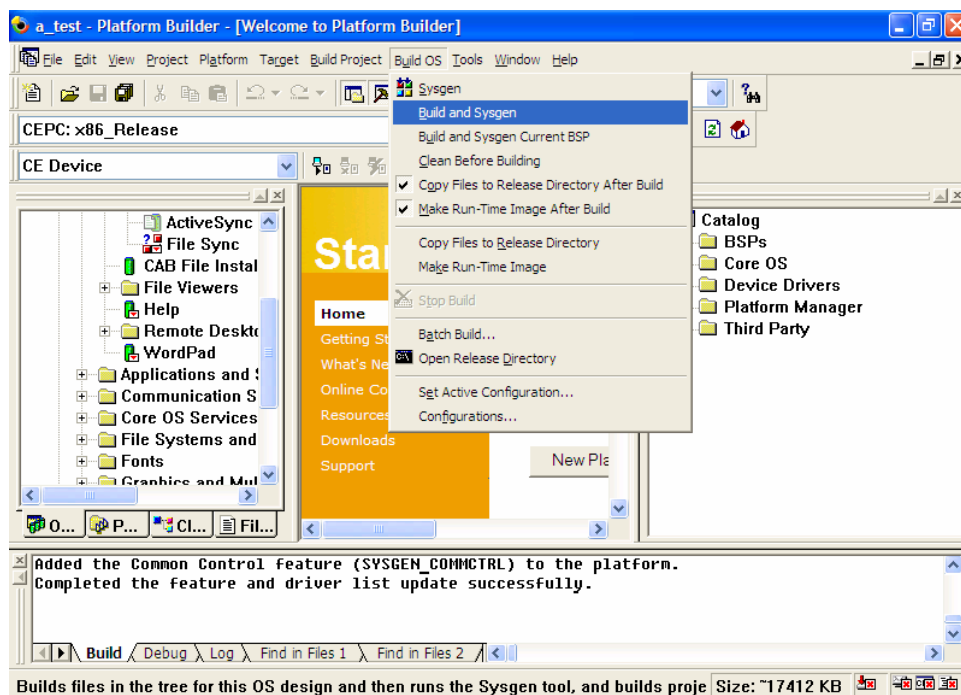
[HKEY_LOCAL_MACHINE\ExtModems\HayesCompat1]

“Port”=”COM2:”

“DeviceType”=dword:1

“FriendlyName”=”Hayes Compatible on COM2:”

- Finally, open **Build OS**, select **Build and Sysgen**, and be sure to click **Copy Files to Release Directory After Build** and **Make Run-Time Image After Build**.



8. Finally, copy your image file to the target Host.

Note: If you have created a Windows CE Platform Builder in the development environment, you can skip steps 2, 3, and 4.

Serial Programming Tools

Moxa provides an easy to use yet powerful serial programming library, and communication troubleshooting utilities under Windows 2000/XP/2003, Windows 95/98, and Windows NT. The following sections provide details about the installation, the library, and the utilities for various platforms.

This chapter covers the following topics:

- ❑ **Moxa PComm**
 - Installing PComm
 - PComm Programming Library
- ❑ **Utilities**
 - Diagnostics (for Moxa boards only)
 - Monitor (for Moxa boards under Windows 2000/XP/2003)
 - Terminal Emulator
- ❑ **RS-485 Programming**
 - ADDC™

Moxa PComm

PComm, a professional serial communication tool for PCs, is a software package that runs under Windows NT/2000/XP/2003/95/98. PComm provides:

- A powerful serial communication library that simplifies serial programming tasks for most popular programming languages. The serial communication library is useful for developing applications for data communications, remote access, data acquisition, and industrial control under Windows NT/2000/XP/2003/95/98, and is a simpler programming solution compared to the more complex Windows Win32 COMM API.
- Useful utilities such as diagnostics, monitor, and terminal emulator.
- Illustrative sample programs.
- Comprehensive on-line documentation.

Installing PComm

To install PComm, run **Setup.exe** from the Documentation and Software CD. Note that the PComm diagnostics and monitor utilities are for Moxa boards only. To use these utilities, you must have a Moxa board and the appropriate Windows (95/98/NT/2000/XP/2003) device driver installed in your system. See the “Software Installation” chapter for instructions on how to install the drivers.

After installing PComm, click **Start**, select **Program Files**, and then the **PComm Lite group** to select from the list of utilities and documents.

PComm Programming Library

The serial communication library helps you develop serial communications programs for any COM port that complies with the Microsoft Win32 API. This library facilitates the implementation of multi-process, multi-thread serial communication programs, and greatly reduces the time required to develop applications.

For a complete description of the library functions and sample programs for Visual C++, Visual Basic, and Delphi, check the help file and the sample programs in the PComm directory.

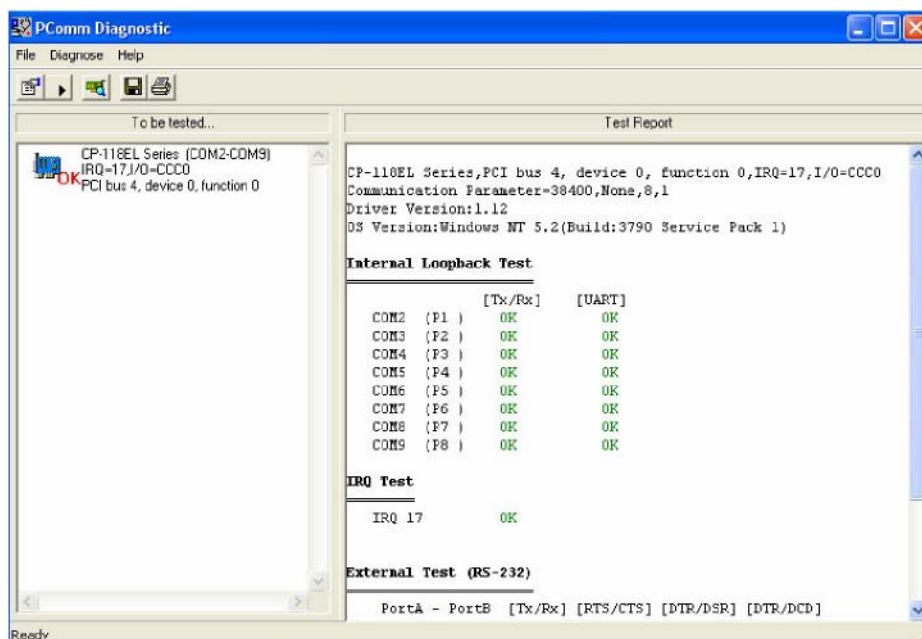
Utilities

In this section, we provide brief descriptions of each utility. For more information about these utilities, read the on-line help from the Documentation and Software CD.

Diagnostics (for Moxa boards only)

This convenient diagnostics program, which only works with Moxa boards and ports, provides internal and external testing of IRQ, Tx/D/RxD, UART, CTS/RTS, DTR/DSR, DTR/DCD, etc. The diagnostics program allows the user to check both the hardware and software functions.

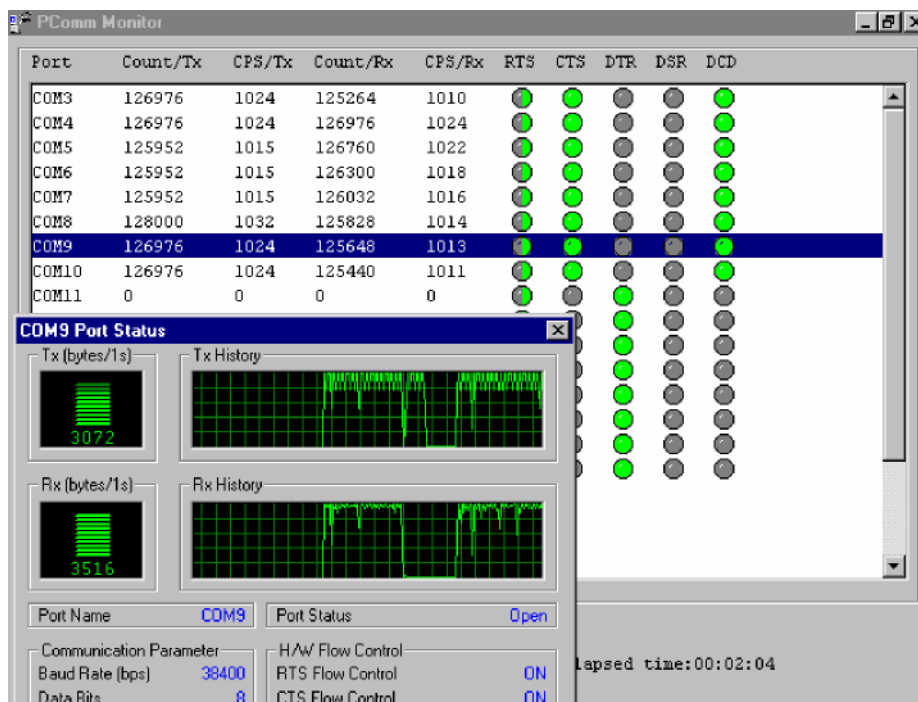
To run the diagnostics program, click **Start → Program → PComm Lite → Diagnostic**. A typical test report for a Moxa board is as follows:



Monitor (for Moxa boards under Windows 2000/XP/2003)

This useful port status monitoring program allows you to monitor data transmission of selected Moxa COM ports. The program monitors data transmission/receiving throughput, and communication line status, with data updated and displayed on the screen at regular time intervals. Click a specific port to see a graph of the current communication parameters and status of that port.

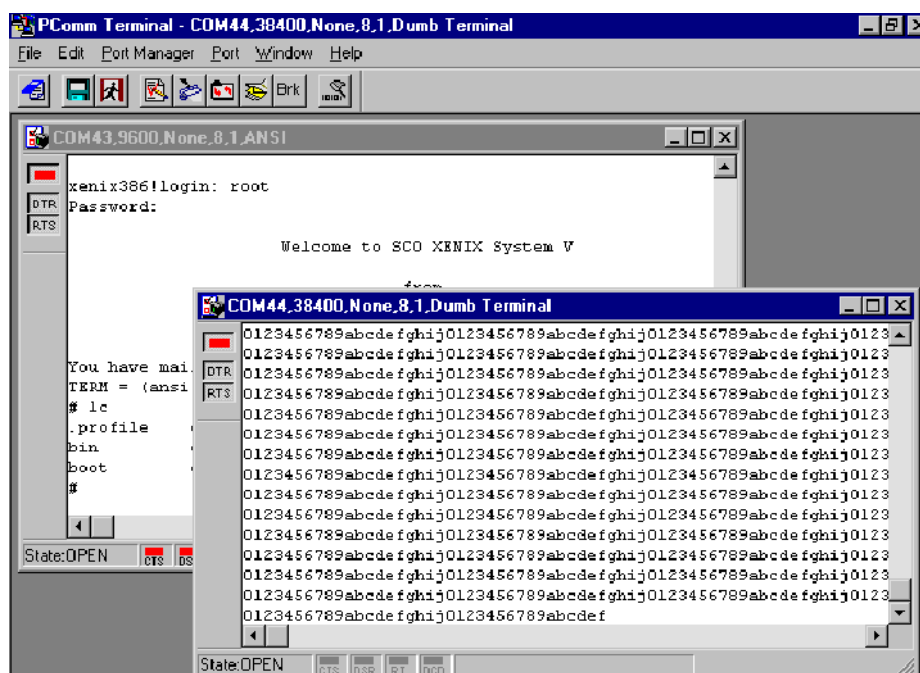
To run the Monitor program, click **Start → Program → PComm Lite → Monitor**.



Terminal Emulator

Use Terminal Emulator to connect to your PC's serial ports to check if data is being transmitted correctly. Terminal Emulator features multi-windows, and supports VT100 and ANSI terminal types. You can transfer data interactively, send patterns periodically, and transfer files using ASCII, XMODEM, YMODEM, ZMODEM, and KERMIT protocols.

To run Terminal Emulator, click Start → Program → PComm Lite → Terminal Emulator.



RS-485 Programming

If you are using your CP-118EL Series board for RS-485 applications, in addition to reading this section, you should also refer to the “Connection Cables and Cable Wiring” chapter for more details about using RS-485.

The CP-118EL Series supports 2-wire half-duplex RS-485 and 4-wire full duplex RS-485 communication. Ports configured for 2-wire RS-485 use the Data+ and Data- pins for both transmitting and receiving data. Moxa's own ADDC™ (Automatic Data Direction Control) technology is used to switch between transmission and reception.

ADDC™

ADDC™ is the best method for switching between transmission and reception when using 2-wire RS-485.

When using ADDC™, additional code is not required to switch between data transmission and reception, since the board's built-in intelligent hardware mechanism automatically manages the switching mechanism. RS-485 programming using ADDC™ mode is just as simple and straightforward as RS-232 or RS-422 programming.

Pin Assignments

To select a PCIe board accessories please refer to the following table:

PCIe Board	Model	Connector Type	Interface
CP-118EL	OPT8D+/OPT8-M9+	Male DB9	RS-232 RS-422/4-wire RS-485 2-wire RS-485
	OPT8B+/OPT8C+	Male DB25	
	OPT8A+/OPT8S+	Female DB25	
CP-168EL	OPT8D+/OPT8-M9+	Male DB9	RS-232
	OPT8B+/OPT8C+	Male DB25	
	OPT8A+/OPT8S+	Female DB25	
	OPT8F+/OPT8Z+	Female DB25	RS-422
	OPT8K+/OPT8I+	Female DB25	RS-422/RS-485
CP-104EL	CBL-M44M9x4-50	Male DB9	RS-232
	CBL-M44M25x4-50	Male DB25	

This chapter covers the following topics:

❑ CP-118EL

- Board Side Pin Assignments—Female SCSI VHDCI68
- Device Side Pin Assignments

❑ CP-168EL

- Board Side Pin Assignments—Female SCSI VHDCI68
- Device Side Pin Assignments

❑ CP-104EL

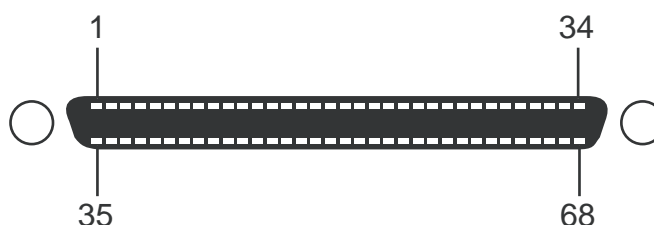
- Board Side Pin Assignments—Female DB44
- Device Side Pin Assignments

CP-118EL

The CP-118EL board has a female SCSI VHDCI68 connector on the board, with various connection options available for connecting from the board to your serial devices. In this chapter, we provide pin assignments for the board side connector, as well as pin assignments for device side connectors for the different connection options.

The CP-118EL board supports RS-232, RS-422, 4-wire RS-485, and 2-wire RS-485. Note that the RS-422 standard uses a balanced voltage digital interface to allow 9600 bps communication over cables of up to 4000 feet in length. You can connect ten receivers to one driver for broadcasting systems. The RS-485 standard is an enhanced version of the RS-422 balanced line standard. It allows multiple drivers and receivers to work on a multidrop network. A maximum of 32 drivers and 32 receivers can be set up on a multidrop network. The CP-118EL board supports both 2-wire half-duplex and 4-wire full-duplex RS-485 communications. In 2-wire RS-485, Data+/- pins are used for both data transmitting and receiving.

Board Side Pin Assignments—Female SCSI VHDCI68



RS-232

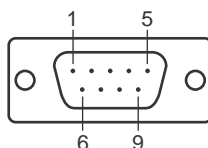
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	RxD6	13	DCD4	25	TxD2	37	RI7	49	RI5	61	TxD1
2	CTS6	14	RTS4	26	GND	38	RTS7	50	CTS5	62	DSR1
3	RI6	15	RI4	27	TxD0	39	DCD7	51	RxD5	63	DTR1
4	RTS6	16	CTS4	28	DSR0	40	DTR7	52	RxD3	64	DCD1
5	DCD6	17	RxD4	29	DTR0	41	DSR7	53	CTS3	65	RTS1
6	DTR6	18	RxD2	30	DCD0	42	TxD7	54	RI3	66	RI1
7	DSR6	19	CTS2	31	RTS0	43	GND	55	RTS3	67	CTS1
8	TxD6	20	RI2	32	RI0	44	TxD5	56	DCD3	68	RxD1
9	GND	21	RTS2	33	CTS0	45	DSR5	57	DTR3		
10	TxD4	22	DCD2	34	RxD0	46	DTR5	58	DSR3		
11	DSR4	23	DTR2	35	RxD7	47	DCD5	59	TxD3		
12	DTR4	24	DSR2	36	CTS7	48	RTS5	60	GND		

RS-422 and 4-wire RS-485

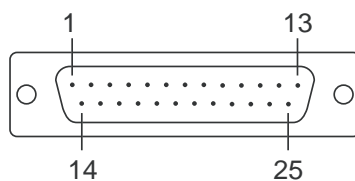
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	TxD6+(B)	18	TxD2+(B)	35	TxD7+(B)	52	TxD3+(B)
5	TxD6-(A)	22	TxD2-(A)	39	TxD7-(A)	56	TxD3-(A)
6	RxD6-(A)	23	RxD2-(A)	40	RxD7-(A)	57	RxD3-(A)
8	RxD6+(B)	25	RxD2+(B)	42	RxD7+(B)	59	RxD3+(B)
9	GND	26	GND	43	GND	60	GND
10	RxD4+(B)	27	RxD0+(B)	44	RxD5+(B)	61	RxD1+(B)
12	RxD4-(A)	29	RxD0-(A)	46	RxD5-(A)	63	RxD1-(A)
13	TxD4-(A)	30	TxD0-(A)	47	TxD5-(A)	64	TxD1-(A)
17	TxD4+(B)	34	TxD0+(B)	51	TxD5+(B)	68	TxD1+(B)

2-wire RS-485

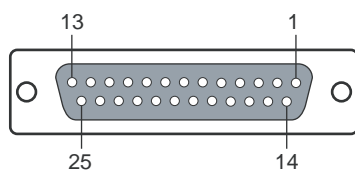
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
6	D6-(A)	23	D2-(A)	40	D7-(A)	57	D3-(A)
8	D6+(B)	25	D2+(B)	42	D7+(B)	59	D3+(B)
9	GND	26	GND	43	GND	60	GND
10	D4+(B)	27	D0+(B)	44	D5+(B)	61	D1+(B)
12	D4-(A)	29	D0-(A)	46	D5-(A)	63	D1-(A)

Device Side Pin Assignments**Male DB9 (OPT8D+/OPT8-M9+)**

Pin	RS-232	RS-422 / 4-wire RS-485	2-wire RS-485
1	DCD	TxD-(A)	---
2	RxD	TxD+(B)	---
3	TxD	RxD+(B)	Data+(B)
4	DTR	RxD-(A)	Data-(A)
5	GND	GND	GND
6	DSR	---	---
7	RTS	---	---
8	CTS	---	---
9	---	---	---

Male DB25 (OPT8B+/C+)

Pin	RS-232	RS-422 / 4-wire RS-485	2-wire RS-485
2	TxD	RxD+(B)	Data+(B)
3	RxD	TxD+(B)	---
4	RTS	---	---
5	CTS	---	---
6	DSR	---	---
7	GND	GND	GND
8	DCD	TxD-(A)	---
20	DTR	RxD-(A)	Data-(A)

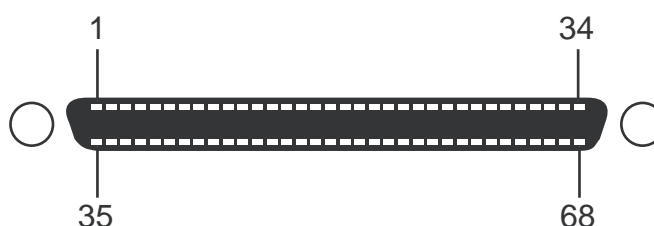
Female DB25 (OPT8A+/S+)

Pin	RS-232	RS-422 / 4-wire RS-485	2-wire RS-485
2	RxD	TxD+(B)	---
3	TxD	RxD+(B)	Data+(B)
4	CTS	---	---
5	RTS	---	---
6	DTR	RxD-(A)	Data-(A)
7	GND	GND	GND
8	DCD	TxD-(A)	---
20	DSR	---	---

CP-168EL

The CP-168EL board has a female SCSI VHDCI68 connector on the board, with various connection options available for connecting from the board to your serial devices. In this chapter, we give pin assignments for the board side connector, as well as pin assignments for device side connectors for the different connection options. The CP-168EL board supports RS-232 interface on board.

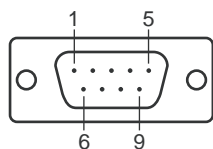
Board Side Pin Assignments—Female SCSI VHDCI68



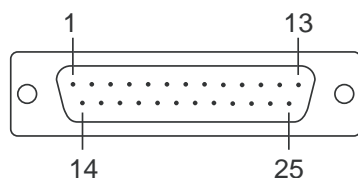
RS-232

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	RxD6	13	DCD4	25	TxD2	37	RI7	49	RI5	61	TxD1
2	CTS6	14	RTS4	26	GND	38	RTS7	50	CTS5	62	DSR1
3	RI6	15	RI4	27	TxD0	39	DCD7	51	RxD5	63	DTR1
4	RTS6	16	CTS4	28	DSR0	40	DTR7	52	RxD3	64	DCD1
5	DCD6	17	RxD4	29	DTR0	41	DSR7	53	CTS3	65	RTS1
6	DTR6	18	RxD2	30	DCD0	42	TxD7	54	RI3	66	RI1
7	DSR6	19	CTS2	31	RTS0	43	GND	55	RTS3	67	CTS1
8	TxD6	20	RI2	32	RI0	44	TxD5	56	DCD3	68	RxD1
9	GND	21	RTS2	33	CTS0	45	DSR5	57	DTR3		
10	TxD4	22	DCD2	34	RxD0	46	DTR5	58	DSR3		
11	DSR4	23	DTR2	35	RxD7	47	DCD5	59	TxD3		
12	DTR4	24	DSR2	36	CTS7	48	RTS5	60	GND		

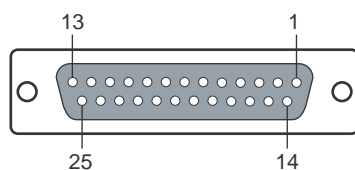
Device Side Pin Assignments

Male DB9 (OPT8D+/OPT8-M9+)

Pin	RS-232
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	---

Male DB25 (OPT8B+/C+)

Pin	RS-232
2	TxD
3	RxD
4	RTS
5	CTS
6	DSR
7	GND
8	DCD
20	DTR

Female DB25 (OPT8A+/S+)

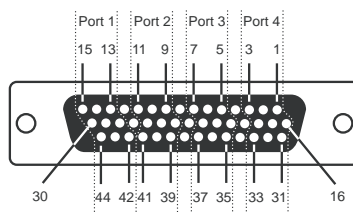
Pin	RS-232
2	RxD
3	TxD
4	CTS
5	RTS
6	DTR
7	GND
8	DCD
20	DSR

Female DB25 (OPT8F+/Z+)

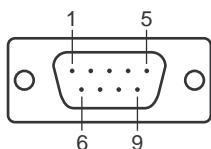
Pin	RS-422
2	RxD+(B)
3	TxD+(B)
7	GND
14	RxD-(A)
16	TxD-(A)

Female DB25 (OPT8K+/I+)

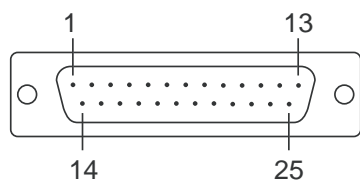
Pin	RS-422 / 4-wire RS-485	2-wire RS-485
2	RxD+(B)	Data+(B)
3	TxD+(B)	---
7	GND	GND
14	RxD-(A)	Data-(A)
16	TxD-(A)	---

CP-104EL**Board Side Pin Assignments—Female DB44****RS-232**

Port 1		Port 2		Port 3		Port 4	
13	TxD	9	TxD	5	TxD	1	TxD
14	RxD	10	RxD	6	RxD	2	RxD
15	RTS	11	RTS	7	RTS	3	RTS
28	CTS	24	CTS	20	CTS	16	CTS
29	DSR	25	DSR	21	DSR	17	DSR
30	GND	26	GND	22	GND	18	GND
42	DCD	39	DCD	35	DCD	31	DCD
44	DTR	41	DTR	37	DTR	33	DTR

Device Side Pin Assignments**Male DB9 (CBL-M44M9x4-50)**

Pin	RS-232
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	---

Male DB25 (CBL-M44M25x4-50)

Pin	RS-232
2	TxD
3	RxD
4	RTS
5	CTS
6	DSR
7	GND
8	DCD
20	DTR

Common PCI Express Series problems and possible solutions are as follows. If you still have problems after reading this chapter, contact your dealer or Moxa for help, or use the Problem Report Form at the end of this manual to report problems to your dealer.

General Troubleshooting

1. **The Moxa PCI Express board cannot be detected by the Moxa driver while installing the driver.**

Hardware causes and solutions:

- a. The board is not installed in the computer. Please install it.
- b. The board is not properly plugged into the system. If this is the case, re-plug the board into a PCI Express slot. It is also possible that a slot has malfunctioned. In this case, try other slots until you find one that works.
- c. The motherboard does not have an available IRQ for the PCI Express board. In this case, enter the BIOS and make sure there is an available IRQ under PCI/PnP settings.

2. **The Moxa PCI Express board and driver are activated but cannot transfer (transmit/receive) data.**

Hardware Causes and Solutions:

- a. Make sure the cable wiring is connected correctly. Refer to the “Pin Assignments” chapter for correct cable connections.
- b. The cable or the board could be defective. Try other ports, cables, or boards to verify this, or use the PComm Diagnostic utility to test the Moxa board and port conditions. If the Diagnostic program reports an error, replace the faulty components.

Software Causes and Solutions:

- a. PCI Express Series boards will check the line status (CTS) before transmitting data if the RTS/CTS flow control feature is set to Enable in the configuration or application program. Refer to the “Connection Cables and Cable Wiring” chapter for proper wiring diagrams, and check the line status of the suspected port using the diagnostics LED indicators on the mini tester.
- b. The board control application may not be written correctly according to the corresponding API of the operating system. To check this problem, run another application that you know is correct, or use the utilities provided by Moxa (such as PComm Terminal emulator or HyperTerminal under Windows platform).

Product Specifications

CP-118EL Specifications

Hardware

Connectors	SCSI VHDCI68
Comm. Controller	MU860 (16C550C compatible)

Interface

Bus Interface	PCI Express × 1
Number of Ports	8
Max No. of Boards	4 (only one IRQ required)

Signals

RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
RS-422	TxD+(B), TxD-(A), RxD+(B), RxD-(A), GND
4-wire RS-485	TxD+(B), TxD-(A), RxD+(B), RxD-(A), GND
2-wire RS-485	Data+(B), Data-(A), GND

Performance

Baudrate	50 bps to 921.6 Kbps
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Configuration

Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2
I/O address/IRQ	BIOS assigned
Parity	None, Even, Odd, Space, Mark
Flow Control	RTS/CTS, XON/XOFF

Power and Environment

Power Requirement	860 mA (3.3V)
Operating Temperature	0 to 55°C (32 to 132°F)
Operating Humidity	5 to 95% RH
Storage Temperature	-20 to 85°C (-4 to 185°F)

Surge Protection	Embedded 15 KV ESD Surge Protection
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Regulatory Approvals	EN55022 Class B, EN55024, EN61000-3-2, EN61000-3-3, FCC Part 15 Class B
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Warranty	5 years
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CP-168EL Specifications

Hardware

Connectors	SCSI VHDCI68
Comm. Controller	MU860 (16C550C compatible)

Interface

Bus Interface	PCI Express × 1
Number of Ports	8
Max No. of Boards	4 (only one IRQ required)

Signals

RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
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Performance

Baudrate	50 bps to 921.6 Kbps
----------	----------------------

Configuration

Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2
I/O address/IRQ	BIOS assigned
Parity	None, Even, Odd, Space, Mark
Flow Control	RTS/CTS, XON/XOFF

Power and Environment

Power Requirement	630 mA (3.3V)
Operating Temperature	0 to 55°C (32 to 132°F)
Operating Humidity	5 to 95% RH
Storage Temperature	-20 to 85°C (-4 to 185°F)

Surge Protection	Embedded 15 KV ESD Surge Protection
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Regulatory Approvals	EN55022 Class B, EN55024, EN61000-3-2, EN61000-3-3, FCC Part 15 Class B
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Warranty	5 years
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CP-104EL Specifications

Hardware

Connectors	Female DB44
Comm. Controller	MU860 (16C550C compatible)

Interface

Bus Interface	PCI Express × 1
Number of Ports	4
Max No. of Boards	4 (only one IRQ required)

Signals

RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
--------	--

Performance

Baudrate	50 bps to 921.6 Kbps
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Configuration

Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2
I/O address/IRQ	BIOS assigned
Parity	None, Even, Odd, Space, Mark
Flow Control	RTS/CTS, XON/XOFF

Power and Environment

Power Requirement	430 mA (3.3V)
Operating Temperature	0 to 55°C (32 to 132°F)
Operating Humidity	5 to 95% RH
Storage Temperature	-20 to 85°C (-4 to 185°F)

Surge Protection Embedded 15 KV ESD Surge Protection

Regulatory Approvals EN55022 Class B, EN55024, EN61000-3-2, EN61000-3-3, FCC Part 15 Class B

Warranty 5 years

PCI Express

The PCI-SIG has defined a new I/O technology, PCI Express, which over time is expected to replace the current I/O bus technologies PCI, PCI-X, and AGP.

One advantage of the serial architecture of PCI Express is the lower pin count for all PCI Express devices compared to PCI and PCI-X. For example, a $\times 1$ Link uses only 8 traces—significantly less than a PCI bus, which uses a minimum of 74 traces. This more pin-efficient design not only reduces manufacturing costs, it also greatly reduces the number of traces that are required on the PCB, thus simplifying the routing of traces. Additionally, this architecture reduces the electrical issues that limit the signaling rate of PCI and PCI-X.

The advantages of PCI Express compared to PCI, PCI-X, AGP, and CardBus include the following:

- Support for multiple market segments and emerging applications
- Cost effective implementation and manufacture
- Compatibility with the PCI software model
- Superior performance and scalability
- Support for new modules

Moxa UART

The Moxa UART is an intelligent asynchronous controller that supports one full duplex channel that simultaneously transfers data at a transmission speed of 921.6 Kbps. To increase overall data throughput, special features such as on-chip FIFO and on-chip hardware flow control are used to reduce the number of interrupts to the onboard CPU, helping to prevent data loss.